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BLAKELEE'S INDUSTRIAL CYCLOPEDIA

A SIMPLE, PRACTICAL GUIDE

FOR THE

MECHANIC, FARMER, HOUSEWIFE AND CHILDREN
OF EVERY THRIFTY HOUSEHOLD IN
TOWN OR COUNTRY.

SHOWING

HOW TO MAKE AND MEND, HOW TO BEST PERFORM THOU-
SANDS OF USEFUL PROCESSES, AND HOW TO DO
ALL KINDS OF WORK INDOOR AND OUT.

A Ready Reference and Reservoir of Useful Information.

40
MORE THAN TWO HUNDRED ILLUSTRATIONS.

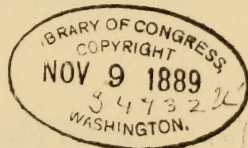
BY

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PREFACE.

PERSONAL experience and observation have taught me to believe one great defect to be found alike in city, town and rural homes, is the lack of knowledge concerning simple mechanical affairs, or, in other words, a lack of ability to construct and repair the multitude of articles which are almost constantly needed for use, and a want of knowledge of the best methods of accomplishing the thousand and one varieties of useful work to be done about a home.

In looking over the books which profess to be practical, both of this country and Europe, I find there is not one of simplified mechanics. Believing that a work that may be turned to by an unprofessional, by men, women and children as a daily aid in industrial affairs, will be favorably received by the masses, this volume has been produced. It is the result of careful labor for years, and if it meets the end for which it is intended, it will most assuredly gratify

THE AUTHOR.

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THE HOME WORKSHOP.

No reasonable man will dispute the importance of having a workshop upon his premises, and especially one who has boys to bring up. Boys will be busy, and if opportunity is not given for a full employment of their time, either with work or sport at home, they will seek diversion abroad, which will not usually result profitably.

Whether it is designed to have the son become a lawyer, preacher, merchant, farmer, or to follow any other vocation, it is none the less essential to have him know some of the principles of mechanical art, and how to apply them, for no man lives an industrious life without very frequently seeing the need of such knowledge. There are certain mechanical rules that apply to almost every piece of work that man attempts to perform, from the folding of a paper to the matching together of two boards, and the bungling manner in which these things are generally done shows how little idea men have of mechanism.

Where there is a comfortable workshop supplied with good tools, the boys are seldom known to leave it upon leisure days to loaf in the streets. If nothing else is given them to do, they will be manufacturing windmills, weather-cocks, sleds, hand carts, etc., and every hour thus employed adds to their skill as workmen. Very soon they will be able to make rainy days as profitable as any other, repairing or making very many important fixtures about the house.

We know a goodly number of boy mechanics who have supplied their homes with brackets, flower stands, step-ladders, and a hundred and one other things convenient and valuable.

Every man should have sufficient knowledge of the use of tools to do a great part of the repairing upon his buildings and implements. This acquirement, with a bench and moderate outfit, will save many dollars annually, and besides give the satisfaction of knowing the work is done as you would wish to have it, which is not always the case, when performed by a disinterested party; and too, a multitude of really useful articles will be manufactured and used when one is enabled to make them, which never would be procured if obtainable only by purchase.

The great difficulty which a novice at the bench has to contend with, is a lack of knowledge concerning lengths, breadths and thicknesses of the different articles he wishes to make, and the author's effort in this book has been to supply that need.

Tools Required for Beginners.—To fit up a workshop, but little outlay is necessary. The following list of tools will answer for the first outfit: Two good planes, a jack and smoother with double bits; four chisels, one fourth, one half, three fourths and inch; a square, try-square; bit stock and six bits; small hand saw, gauge, compass, bevel, draw shave and hammer. These will not cost, of good material, and they should be of the very best, more than ten or twelve dollars.

Importance of Good Tools.—It is very difficult for a good workman to execute a nice job with poor tools, and, of course, very much more difficult for one unaccustomed to the use of any to perform work that would be passable. Good mechanics, however, are very seldom found unsupplied with proper prerequisites for their trade; but the unprofessional, in three cases out of five, will have an old single bitted jack plane; a kinked up hand saw, that has been handed down from the grandfather; a used up chisel; an iron faced twenty-five-cent hammer, etc.; and whenever he attempts to saw a board square, or to drive a nail, such bad work is made that the conclusion is at once arrived at, that nature never intended him for a mechanic, and he is very glad that three years were not fooled away serving an apprenticeship.

The best workman living cannot plane a board smooth with a single bitted, nicked up jack, or cut a board so as to make a good joint with a dull and kinked saw, or leave a good finish when driving nails with a soft faced, battered up hammer. But a novice with good tools will work out a very fair job the first time trying, if blessed with an ordinary amount of mechanical ingenuity.

A mechanic has some pride in the appearance of his "kit," and the unprofessional may as well keep his workshop outfit in a respectable condition as any other. It costs no more, and always has a tendency to elicit credit to the owner from others. And then there is another influence which always is for good, and that is, the improved execution of workmanship when handling tools of nice appearance. There is a sort of pride connected with shoving a good hand saw or plane, that will prompt a man to be very particular with the work he is doing.

Old tools are good in their places, and a few should be kept for dirty jobs; but do not give them to the boys to work with after they are old enough to exercise discretion in the shop, for the inherent pride spoken of above is stronger in them than those older. If they have a nice outfit, care will be exercised in the use of them; but if put off with those that are old and rusty, the effect will be exactly opposite, and the boys will grow up botch workmen. A habit instilled in youth will be very hard to eradicate in after life.

The Shop Scrap Box.—It is well to have the workshop provided with awls, rivets, buckles, leather, etc., so that harness or machine bands may be repaired at such times, as too great a delay would have to be made to take them to a harness or shoe shop.

Doing Fine Work.—I do not advocate that an inexperienced workman should attempt to do fine or difficult repairing, for it would not be profitable to attempt such work. If a wheel of the wagon or carriage is defective, it will be better to take it to a wheelwright and have it put into good condition by him, and so it will be with many things; but for ordinary work the greater portion may be done at home, and with a decided saving.

To Lessen Noise in Workshops.—It is sometimes desirable to check the noise of the workshop, where it is located in the residence, and the sounds are transmitted through the floor to the apartment below. This may be done by the use of rubber cushions under the legs of the work bench, or of kegs of sand or sawdust applied in the same way.

A few inches of sand or sawdust is first poured into each keg; on this is laid a board or block, upon which the leg rests, and around the leg and block is poured fine, dry sand or sawdust. Noise and shock are prevented. An ordinary anvil so mounted may be used in a dwelling house without annoying the inhabitants.

BECOMING A MECHANIC.

While this work is not intended for the practical, scientific workman, I have a word to say to young men who contemplate becoming mechanics, respecting the mistake often made in estimating qualifications for the enterprise.

An opinion is too prevalent that a trade can be sufficiently learned in a few months, or a year at most to master the business. In order to become an adept in any calling, a person must receive the full lessons of experience.

Let him be ever so familiar with the theories in all of the details, by the study of books, he is poorly qualified to secure success without a thorough, practical knowledge of the branch of industry he has selected to pursue; yet aside from the physical efforts which are necessary to make a mastery, in the life of the mechanic, there must be a due mental exertion.

It is only the absolute and pressing demand for mechanics that gives so many poor workmen employment, and while the inferior workmen get employment, they are not getting such wages as the times demand.

A first class mechanic can secure almost any price within the bounds of reason, and can hold a position permanently so long as there is work to be performed, while the underling is constantly changing, and when the time comes for reducing the help he is the first to be discharged. Now what I wish to particularly enforce upon the young men at this time is the importance of getting a full knowledge of the business that is chosen as an occupation, before leaving the apprenticeship to attempt "jour." work.

It is thought that after something of an insight into a trade has been ob-

tained, greater wages can be secured than by continuing with their instructors ; and this is a fact, but for every dollar gained in the first two years after making the change, ten will be lost in the subsequent two, and for the simple reason that an unskilled man attempting the work of a jour., as he can obtain jobs here and there, never becomes efficient as a mechanic, and never receives a first-class mechanic's wages, after a display of his absolute ability has been made.

Further than this, to be successful as a mechanic, a person must entertain sentiments of self respect, or, in other words, he must feel that he does not degrade himself by his employment, and that to be engaged in it, he will be considered honorable by those whose good opinion he is anxious to secure.

Here we meet with one of the worst follies of which young men are guilty. An idea has very extensively obtained possession of the mind, that a mechanic is not as respectable as people who engage in lighter callings, or no calling at all. A person thus impressed is in no condition to enter successfully upon a career of usefulness as a mechanic ; he sets himself to work, if he makes an attempt to master the trade, with a mill stone around his neck. He does not respect himself, his calling nor his associates. He is without a motive adequate to the stimulation and development of his better faculties, and goes about his business feeling like a drudge, rather than as an honorable and high minded aspirant after a laudable and praiseworthy object.

This fear of losing dignity among the American people is becoming alarming. Comparatively few of the native young men are becoming mechanics, and already we have to look abroad for nearly all of our men to sustain the mechanical industries. The reason of all this deficiency of native mechanics, as I have said before, is not owing to there being an insufficient remuneration for labor, but from a foolish pride and absolute laziness. It is better to be a good bricklayer than a poor lawyer ; a first class carpenter than a common doctor ; and a man is much more independent as a successful shoemaker than as a poor editor, book-keeper or clerk ; and it is worth while for young men and parents to think of these things.

A good trade is always a comforting companion to travel with, a something that a man can fall back upon in time of need ; and yet it does not preclude him from entering upon some profession, if his inclinations or genius develop the proper capacity. In fact, our most successful business men in almost every capacity are from the workshops and farms,

There are high positions to be acquired in mechanical arts, and every workman has a right, and an opportunity to become a master in these ; indeed, a man can be great in anything if he has the proper elements in him.

If he has not the proper elements for becoming a master mechanic, he had better seek other employment. The first thing to determine should be where the special gifts and qualifications lead, and then follow.

TOOLS—FITTING UP AND USING.

Managing Bench Planes.—Young carpenters are very likely to disfigure their bench planes unless they are taught at the start to handle them correctly. The hammer should never be used to loosen the bits. By inverting the jack and jointer, and hitting the forward part a blow upon the bench, the bit will drop out. By hitting the small end of the smoother the same effect will be obtained. When setting or adjusting the bits a very light tap upon the planes, on the places indicated for removing the bits, will cause the blades to recede. For this work use a square faced hammer, and be careful how it is used.

When shoving the plane a curving motion will be found of decided benefit, as the bit then crosses the grain of the wood at an angle. Where the timber is cross grained keep the plane bit sharp, and set the cap down very near the edge. Shove the plane inclined sidewise a little.

A light coating of linseed oil, applied once in a while, is a benefit to planes, but should not be used upon metals. Almost any kind of animal oil may be applied to steel, providing it contains no salt. When grinding keep the same bevel upon the bit that is formed upon the new, and do not grind the face more than to take off feather edge.

Selecting Bench Planes.—Second growth beech is the best wood for planes. Something of its utility can be told by the growth lines upon the end of the plane. The further these lines are apart, the harder the wood, and the harder the wood the better. See also that the timber was split, and not sawed out. This can be told by following the grain through upon the surface of the plane. If sawed, the grains may be crossed, which would make the plane objectionable. Take those with double bits, and see that the wedge fits nicely, and is of good timber.

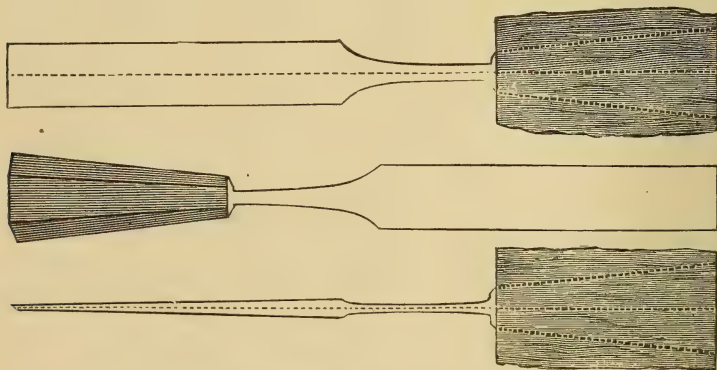
Putting on Chisel Handles.—It is always best to buy chisels already handled, but there are frequently those requiring new ones, and sometimes it is necessary to purchase them without any. No one, unless a skilled workman, should attempt to put on turned handles, for they are very liable to be split, and very difficult to set true; and if not set true, the chisel will most certainly be broken if a mallet is used upon it.

Fine grained, seasoned hickory is the best wood for handles. Cut into blocks about one and a half or two inches square, and four and a half inches long—vary the length more or less, according to size of chisel. Bore a hole in the center of one end with a bit about the size of the shank at the base, but do not sink the cut more than an inch; then use a smaller, the same depth, and so on until a hole is made as deep as the shank is long, except about half an inch.

Now screw the blade of the chisel in the vise firmly, and drive on the handle

block carefully; if going too tight, remove and enlarge the hole. When the block is driven up to the shoulder, then you are ready to true up and shape the handle.

The first thing to be done is to smooth the block off on the side of the chisel face, but do not remove much wood; then with a straight edge—a common square is best—draw a line down through the centre of the block. To do this accurately, set the straight edge exactly in the middle of the cut of the chisel, and over the centre of the shank, as shown in illustration; this will be right for the guide line.



HOME MADE CHISEL HANDLES.

Measure from the line each way, at the head of the handle, equal distances, making the breadth from seven eighths to an inch and an eighth, according to the size of the chisel; then from these two points draw lines to the outer edges of the shank shoulder, and shave away the wood upon the sides down to the lines. Now line again from the centre of the chisel sides, and work off as before.

Chamfer the corners until shaped to please the eye; then round the head or top enough so that a blow from the mallet will strike the center, and not the edges. If the corners are hit, pieces will be split off, and the handle spoiled.

A set of good, seasoned hickory handles, even if in daily use, will last for years.

Selecting Chisels.—There are two things to be observed when selecting chisels for the shop. The first is that the handles are good, and that the blades set true in the handles. If the blades are not in perfect line with the handles, they will be very likely to break under a sharp blow. See that the handles are either of hickory, ironwood or appletree.

The second feature to be observed is the trueness of broad chisels. Look at the flat surface, or face, and see that they are not warped.

Whetstones.—All stones used upon the work bench are not alike in the nature of their formation. When first putting a new whetstone into use, try water upon it, and if this keeps the surface from being glazed or burnished, oil will not be needed. Some stones work better with water than oil. A dry stone is very apt to give a wire edge. It has been said that a little carbolic acid added to water will increase the cut on either a whetstone or a grindstone.

Instead of oil, which thickens and makes the stones dirty, a mixture of glycerine and alcohol is used by many. The proportions of the mixture vary according to the instrument operated upon. An article with a large surface—a razor, for instance—sharpens best with a limpid liquid, as three parts of glycerine to one of alcohol.

For a graving tool, the cutting surface of which is very small, as is also the pressure exercised on the stone in sharpening, it is necessary to employ glycerine almost pure, with but two or three drops of alcohol.

Whenever oil is used, the stone should be covered as soon as the work is completed. If not, dust settles and is held by the grease, so that the stone will have to be cleaned to get its best action the next time it is wanted for use.

To Face an Oil Stone.—The simplest and most effectual manner of facing an oil stone that has become hollow is to lay a sheet of No. 3 sand paper on a level board, and rub the face of the stone upon the sand. The stone should, however, be cleaned with warm water, in order to remove all oil or grease; if the sand paper becomes filled with the cuttings from the stone, brush it with a stiff broom. No. 2 glass paper is also used, and will cut away faster than sand paper. Five or ten minutes rubbing will be found sufficient. Your glass paper will not be spoiled by the operation.

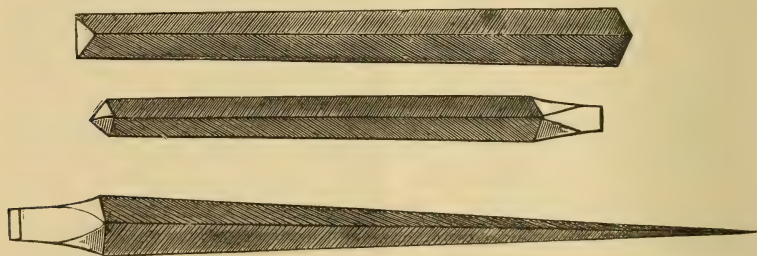
Worn Out Saw Files.—Around almost any house may be found half a dozen worn-out, three-cornered files, which are generally considered worthless; but they are not, and should never be thrown away. If not too badly used up they may be cut over, or renewed.

Resharpening Files.—Remove all the grease from the steel and submerge the files in a solution made by putting one ounce of sulphuric acid in a pint of soft water. Watch them, and let the files remain in only long enough to become sharpened. A little, water-tight wood trough should be used to hold the solution, as it will eat metals. The renewing in this way will not cost one cent each, and they answer a very good purpose, but are not so good as when cut in the original way with the cold chisel.

Another Method.—Wash the files with hot sal soda water, and remove all grease with a coarse brush and cloth. After becoming perfectly clean, suspend in a mixture of concentrated nitric acid, with eight parts by measure of water, for twenty-five minutes; then well clean in water with brushes, and re-immerses for twenty-five minutes more in the acid mixture with addition of another eighth of strong acid.

Brush again and re-immersé, after adding to the bath a sixteenth part of concentrated sulphuric acid. This heats the bath, and the etching proper now commences, and is kept up for three minutes, with a vibratory motion of the bath. Wash and brush and re-immersé in a bath similar to the last, with similar agitation, for five minutes. Wash repeatedly with water, then with milk of lime, finally rinse again with water, dry quickly at a gentle heat, and varnish while still warm, with oil.

How to Clean Files.—When a file gets clogged with particles of wood, it ceases to cut well, and should be cleaned. There are several modes that are effectual, and perhaps the most convenient is to dampen the file, and then with a block, wedge, or thin strip of board, run the ends of the grains across the steel on a line with the cut. The particles of wood becoming moistened, expand, and are easily rubbed away; but it can only be done by working the cleaner crosswise the bar, and with the grooves.



SAW-SET, COUNTERSINK AND REAMER FROM OLD FILES.

Another method is to rub the file briskly upon a piece of woollen cloth which has been drawn tight. The file must be moved across the fabric the same way that the steel is cut, so that the fibers of the cloth can clear out the furrows. A file exposed to steam of high pressure, for a minute or two, will come out as clean as new. The use of a metal brush or card for cleaning wood files is not profitable; it will answer well, however, for cleaning those used upon iron or steel.

Saw-Sets of Files.—Files that are too far gone to be renewed, may be put to various uses. A good saw-set can be made by cutting the file off at the heel, or base of the handle, and again an inch or more from the point; grind the ends square, and the sides smooth, as illustrated. Nail-sets may be made in the same way. Different sizes should be kept, as a very large or very small one will not answer for all uses.

Countersink of a File.—By having the heel shaped to fit a bit-stock, and breaking off an inch or two of the point, and grinding it diamond shape at the end, as shown in engraving, you have a good countersink.

Turning-Chisel of a File.—Remove a little of the point, and grind the

end beveling so that it is brought to an edge upon one of the sides, and make that side smooth, and you have a nice turning-chisel, or graver. A pointed tool may be made for the same purpose by grinding the bevel upon a flat side, making the terminus at one of the corners.

Reamer of a File.—By fitting the heel to a bit-stock and grinding all of the sides smooth, as represented in cut, you have a good reamer for enlarging the screw holes in hinges, and other irons.

Cold Chisels, Punches, etc.—A blacksmith by little work can convert old files into cold-chisels, scratch-awls, punches, small butcher-knives, screw-drivers, drills, twisted gimlet-bits, etc., which are worth twice as much as those you buy at the hardware store.

Tempering Files for Cold Chisels, etc.—Heat the file gradually to a cherry red heat, then dip in water about one inch of the chisel's end, until it comes to a black heat, then rub with a rubber until you see a blue color, then quench it at once.

Home Made Cold Chisel.—Generally speaking, it is cheaper to buy a cold chisel than to make one; but still it is not always handy to do so. To make one at home, take a worn out flat file, not very large; break a piece out of the centre about six inches long; heat it not quite to a red heat; then put it into the warm ashes of the fire, and let it cool slowly. This will draw out the temper and make it comparatively soft. Now grind into the desired shape. At one end grind each broad side until it comes to an edge, not slim, but rather stubbed. Square the other end, and it is ready to temper again.

To temper, heat the cutting end until an inch or so is red hot; then touch the edge to cold water, a little at a time, until it is somewhat cool, watching closely, and when it takes on a bluish straw color plunge it into water all over. This will answer for cutting soft iron. While the edge will be hard, the upper part will be soft enough not to break by pounding upon it. If a blacksmith is handy he can make a cold chisel of the file much quicker and better upon his anvil, and the tool will be "hammer hardened" as well as properly tempered.

The "poll" of an old ax, or even a drag tooth, driven into a large block, makes a very good thing to cut rivets, wires, nails, etc., upon, and will be found handy.

To Prevent Handles Splitting.—To prevent handles (to be pounded upon) from splitting, where beauty is not sought, follow the shoemaker's plan, and put on the end, after sawing it off square, two round disks of sole leather. The two thicknesses of leather will prevent splitting, and if in the course of time they expand and overlap the wood of the handle, they are simply trimmed off all around. The leathers may be fastened with shoe nails.

Hardening Fine Tools.—It is said that the engravers and watch-makers of Germany harden their tools in sealing wax. The tool is heated to whiteness and plunged into the wax, withdrawn after an instant and plunged in again, the process being repeated until the steel is too cold to enter the wax.

To Select Sand Paper.—When buying sand paper, rub your finger upon the surface, to see if the sand is well secured; then tear the edge of the paper to test the strength. If badly made or rotten, don't take it.

How to Use Sand Paper.—If a single thickness of sand paper is to be used, wrap it around a block of wood, and better service is obtained than by holding it in the hand, especially upon an even surface. A sheet doubled to several thicknesses, and rubbing surface changed occasionally, will wear well.

To Make a Level.—Dress out a piece of inch and a quarter plank, two feet long and four inches wide, and see that it is true. Take a small, short-necked vial and fill it with water and cork it so as to leave a little vacuum.



HOME MADE LEVEL.

The cork should fill the neck lengthwise. Now as the bottle is turned upon its side, the "bubble" will pass from end to end as it is moved. Drive a tack at the center of each edge of the block, lay the vial on the flat surface-center and draw the string over the exact center of the large part of the vial, and tie it tight. Now, when the block is level, the "bubble" will be under the string, as illustrated.

By setting this one foot from the ground surface and sighting across it, the decline of a field may be obtained. Deduct the one foot from height where sight strikes the opposite side of field.

To Prove a Plumb Level.—When a plumb level has been purchased, it is always well to prove it in the perpendicular, for serious mistakes might occur if it were wrong. To prove it, drive a nail into a wall or post, leaving one inch projecting, and in such position that a plumb and line may swing free of obstruction. Then let a delicate line be suspended so that it will touch the most prominent part of the nail head. Then two or three feet below the nail, and exactly under it, insert a screw, and drive it up until the delicate line, to which a bob has been attached, will just touch the most prominent points on the heads of the nail and screw, and you have two points perpendicular to one another. To these points apply your plumb rule, which, if true, will correspond. This is a quick and easy way to make the test.

To Mark Steel Tools.—Warm them slightly and rub the steel with wax or hard tallow till a film gathers. Then scratch your name on the wax, cutting through to the steel. A little nitric acid poured on the marking will quickly eat out the letters. Wipe acid and wax off with a hot, soft rag, and the letters will be securely etched.

How to Grind Tools.—Plane irons should be ground to a bevel of about thirty-five degrees—chisels and gouges to thirty. Turning chisels may some-

times run to an angle of forty-five. Molding tools, such as are used for ivory and for very hard wood, are made at from fifty to sixty degrees. Tools for working iron and steel are beveled at an inclination to the edge of from sixty to seventy degrees, and for cutting gun and similar metal range from eighty to ninety.

Mechanics claim and believe that by holding on the grindstone all edge tools, so that the action of the stone is at right angles with the plane of the edge; or in plainer words, by holding the edge of the tools square across the stone, the direction of the fibres will be changed so as to present the ends instead of the side as a cutting edge. By grinding in this manner a finer and smoother edge is set, the tool is ground in less time, holds an edge a great deal longer, it is safe, and is less liable to "nick out" and break.

Care of the Nail Hammer.—This tool should never be used for pounding stones, or any hard material. The face should be ground true and level, so that a line across the face will run parallel with a line cutting the middle of the handle. A hammer having a round face, when employed to drive nails, is very apt to bend the nails over before they are driven in, unless the head of the nail meets the centre of the face. A cobbler's hammer, with which few men can drive nails, is made with a convex face, so that the corners will not cut through leather.

Grinding a Hammer.—When the face of a hammer becomes uneven, so that it is difficult to drive a nail true with it, put the face to a grindstone for awhile and the defect will be overcome.

Care of the Grindstone.—Keep your grindstone under shelter; exposure to sun and rain will injure it more than ordinary use.

To Face a Grindstone.—To keep a stone in order the wear should be equally distributed over its face. Neglect of this is chiefly experienced with narrow tools, which should be made to traverse across the face of the stone in grinding, care being taken to bring it quite to the edges of the stone, which would otherwise be hollowed out at the middle portion of its face and be spoiled for sharpening broad, flat tools. The same precaution generally needs to be taken in grinding axes, the edges of which are more or less curved, so that only a part comes in contact with the stone at one time. If the stone once becomes irregular or eccentric in its form, much labor will be required to make it true again.

Water for Grindstone.—It is of course necessary that the stone should be kept wet when in use, otherwise it would draw the temper of the tools before it had turned around half a dozen times, but it is often the case—with farmers especially—that so much carelessness is shown in the means used for this purpose, that the stone, if ever so good at the outset, is soon spoiled. This comes from letting the lower part of the stone dip into the water when not in use. The water soaks and softens this portion, which consequently wears away

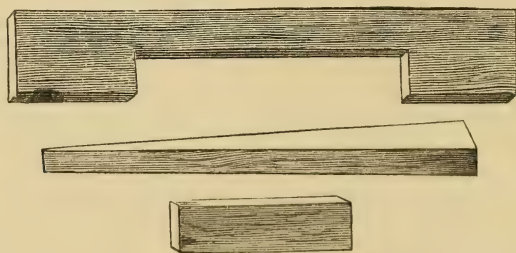
much quicker than the rest, and pretty soon the stone is out of true—a difficulty that always grows worse very fast.

The best way is to hinge the water trough to one end of the grindstone frame and sustain the other by a strap with two holes to catch on a pin at the adjacent end of the frame. By catching the lower hole upon the pin, the trough will be raised so that the under side of the stone will be immersed; and by letting down the trough and catching the upper hole upon the pin, the water will be brought out of contact with the stone, at the same time that the trough is held in position to be conveniently raised again when required. Both the strap and the hinges, which should be pretty strong, may be made of an old boot leg and fastened to their places with shingle nails.

Truing of a Grindstone.—Good work cannot be done upon a grindstone that wabbles. The first step toward putting a stone in proper order is, measure from the center of the eye to the surface, on four sides, for the purpose of determining whether the stone has been worn off more on one side than on the other. When a stone is driven by a treadle, a large part of the grinding is done on one side of the stone when the treadle is going down. In such a case, the stone should be re-hung, with the journal nearer one side of the eye than the center of it.

If it wabbles from side to side, and is not supplied with iron attachments having screws, it may be adjusted by the use of wooden edges.

Self Sharpening Grindstone.—The grindstone is said to be self sharpening. After having been turned in one direction for some time (if a hard stone), the motion should be reversed. Sand of the right grit applied occasionally to a hard stone will improve it.



CHEAP WOOD CLAMPS.

Cheap Wood Clamps.—Where one intends to do his own repairing, a very necessary requisite is a supply of clamps of different sizes. One can be made in five minutes, and its uses will be manifold. Particularly is it convenient in gluing articles together, or for holding two pieces in place to be scribed or bored. They may be made of boards or planks anywhere from half an inch thick to two or more inches, so as to clasp anything from a toy whistle to the bed of an ox cart. A very good size for furniture mending is made from a

strip of board, say nine inches long and three inches wide. Two and a half inches from each end saw down from the edge half way through the board and split out the piece. Now make a few blocks of different thicknesses, an inch or so wide and three inches long, and a few wedges same width, four or five inches long, three quarter stuff, and tapering from one end to an edge at the other, as represented in illustration. This will make the clamp outfit. The blocks may be used or not, according to the thickness of the article to be held in place. In gluing, always use this where it is possible, and key up firmly by use of the wedges. As before said, the clamps should be made of various sizes, and kept ready for use.

Using Tools on Wood.—All edge tools used upon wood should be applied with a side stroke, or, in other words, with a drawing stroke. The plane, instead of being pushed straight ahead on the broad surface of a board, should have a sweeping stroke. In drawing the shave one hand should be carried just a little in advance of the other, and the shave drawn with a slightly sliding stroke. The philosophy of this may be seen by testing the edge of a razor. A person may press his bare hand on the keen edge of a razor without cutting the skin. But let the hand or the razor be drawn a trifle while pressure is being applied, and the cutting edge will enter with far less pressure. As some cutting instruments must be worked with a crushing or straight stroke, it is of great importance that the cutting edge be brought to as perfect an edge as practicable, by means of a fine gritted oil stone.

Selecting a Screw Driver.—To be good, a screw driver should be neither too hard nor too soft. A very good test is to file the steel. If the file will not take hold, it is too hard. The file will also very quickly determine whether or not it is too soft. I like one fitted to the bit stock better than those with handle. Power can be applied with much less outlay of strength, on account of the leverage of the bit stock.

Long and Short Screw Drivers.—It is generally believed that there is no difference in the driving power of a long and short screw driver; but the editor of the *Artisan* thinks differently, as he made a test which appears to be conclusive. He selected a piece of very hard cherry timber, and bored a number of uniform holes in the same; then took screws of same size and a long and short screw driver to sink them with, using the same handle upon both. He first put in the screws as far as possible with the short screw driver; then with the long screw driver he was able to force each screw considerably further into the wood.

He then reversed the experiment. With the short screw driver, and with the utmost exertion, he could not start a single screw; but with the long screw driver he took them all out. He next sought the cause of the difference, and found it in the crank-like action of the screw driver.

To prove this he constructed a guide with holes bored therein, so as to keep

the screw driver always in line with the vertical axis of the screw. In this position the long screw driver had no perceptible advantage over the short one. He found that each screw driver would bear to be inclined at the same angle from the vertical axis without losing its hold on the screws, but, of course, the longer the screw driver the further its upper end would be from this vertical line, and the greater its leverage would be, owing to the crank-like action or sweep about the vertical axis.

Grinding a Screw Driver.—Grind with a long bevel, and not thinner than half a sixteenth of an inch on the edge; after grinding, take a saw file and file two or three slight creases on each side parallel with, and as near the edge as possible, and you will find that you will not be troubled by the bit slipping out of the screw head.

A screw driver works nicely also when ground slightly concaved on each side. This allows the end of the screw driver to rest upon the bottom of the kerf without any pressure on the top edges, and at the same time the slight curvature from the end up draws the screw driver toward the bottom of the kerf, instead of slipping out, as it is sure to do if ground beveling, after the common custom.

In driving a screw into wood, the force used to press the screw driver against the head of the screw tends to aid the latter in penetrating the wood, but when we attempt to extract a screw, every pound of pressure applied tends to render it more difficult to get the screw out. Therefore, it is important that the screw driver should be so formed that it may be kept in the nick of the screw by the exertion of the very least degree of force.

With a screw driver in good order, there is no danger in tearing or splitting the head of the screw, and the whole strength may be applied to turning the bit instead of pressing against it to keep it in its place.

Tempering a Screw Driver.—A dark or full blue secures a hard, but not brittle temper; it will possess some elasticity, and can be cut by a file; if tempered harder than this it will break. The proper temper can best be obtained by heating to a cherry red, cooling off in oil, and drawing on a hot bar of iron until the proper color is reached, when it should be cooled off immediately by plunging it in cold water and oil.

Selecting Brace and Bits.—Wooden braces are preferable to iron ones, generally speaking. They are more liable to be true in their action, and are not so cold to handle on a frosty day.

Do not buy the pod bits. They are not so satisfactory as the auger or gimlet bits. The only advantage the pod has is in point of utility. I once had a set that had been in almost daily use for twenty years.

In purchasing, see that the bits fit the stock firmly. Set the point of the bit on a block and turn the brace to see if there is a wobble.

Selecting the Draw Shave.—For common use one of medium size should be selected. If preference is to be given either way, take the larger.

A small shave on a large, hard stick will spring and jump, while a large draw shave on small work is provokingly awkward.

Pay a fair price for this tool, and buy it of a merchant who will warrant it to be good. A great deal can be told by the "feel" when holding the shave in imaginary use. Do not buy an adjustable handle shave. You must have the handles always the same to do close work.

The Bench Vise.—Carpenters and joiners commonly use what is called the side vise. One jaw is brought by a screw against the side of the bench. For general purposes the vise should extend above the bench about eight inches. It may be of either wood or iron, but in the home repair shop, and especially for the use of boys, the wood is preferable to iron, as tools will not be broken or dulled upon it. Iron plates can be put upon the insides of the jaws when they become worn.

The Jack Knife.—As the pocket knife takes an active position in the bench outfit, a few hints respecting it will not be amiss. In purchasing, do not take a two bladed knife if the blades are placed one in each end, for such a knife will not stand hard usage. To make the blades shut into the handle lapping by each other, they must be set at an angle; therefore, are not true with the handle, and sufficient leverage is given when whittling to break the blades off at the base.

As the pocket knife comes from the store, its edge is unfit for use; it may cut soft wood, but it will not sharpen lead pencils. Use a good oil stone for sharpening. The motion for whetting or honing should be circular; not as in stropping a razor, merely back and forth. The educated fingers will readily feel when the blade bears properly on the surface of the stone, and will guard against the mere abrasion of the back and the cutting in of the edge.

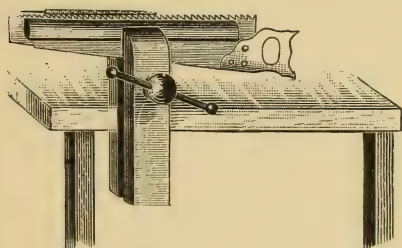
Selecting Hand Saws.—More can be done with the hands than the eyes in selecting a saw. First, choose one of the right size, which is a medium, and then put it to test with the hands. See that the blade is of even thickness. The fingers are the best guides in this matter; by passing the saw blade between the thumb and forefinger, or laying the blade on a smooth board and passing the palm of the hand over it quickly, the slightest unevenness can be detected.

The blade should be elastic. By taking hold of the handle and holding it so that the side of the blade is up, and giving it a rapid motion, you can easily satisfy yourself. If the motion is quick, even and light, you need not fear; but if there be stiffness, and an irregular motion, you may depend upon it, the blade is not of good material.

Temper is the main thing in holding edge or set, and the color of the blade is a good indication of its temper. Select one as near the color of the clear air in the distance as you can, as that generally will prove to have a good spring temper. A glass color is too hard, and a dark or lead color is too soft.

How to Set a Hand Saw.—This may be done by laying the blade upon a piece of hard wood plank, and bending the teeth with a hammer and punch. The punch or set can be made best by breaking off both ends of a three-cornered file and grinding the small end flat and true, as illustrated on page 16. Set the punch square upon the tooth, but inclined a little over the point, and hit it a light blow with the hammer. Every other tooth should be bent in this manner, then the saw turned over and the operation repeated. The set in the saw before the work is begun will be the guide as to the direction the tooth is to be bent. A very good rule to govern the setting, is to bend the teeth half the thickness of the blade.

Jointing a Hand Saw.—If the saw previous to setting is inclined to catch and jump, one of three things is the matter: the set is uneven, a few teeth are longer than the rest, or they have been filed hooking. Either of these troubles can easily be detected and remedied. If, by looking along the teeth from end to end, an unevenness is seen upon the sides, lay the blade upon some flat iron, and strike gently with a hammer upon the teeth until all the set is taken out, and then set it as above directed.



JOINTING A HAND SAW.

If, after the saw is properly set, some of the teeth are found to be longer than others, run a fine flat file over the points lengthwise until they are all brought to a length, after the manner of illustration. The saw is now ready for filing. The saw should be kept about one-eighth of an inch rounding, and never be allowed to get hollowing.

To File a Hand Saw.—Hand saws are filed in two ways, one with the teeth beveling, for cutting across the grain of wood, and the other for ripping, with the grains across their ends. For ordinary purposes the common, beveled tooth hand saw will answer all requirements.

The file should be put between the teeth diagonally, but held level. Every other space should be filed from both sides. Keep a uniform bevel clear through, and do not allow the file to cut on return. Always do the filing where there is plenty of light, and the first time through, do not bring the tooth quite up to a sharp edge, as the second time through will take off a little steel. Be exceedingly careful to stop filing as soon as the tooth is filed to a complete point. One thrust with the file, after the tooth has been brought to a perfect edge, will shorten it, and put the saw out of order just in proportion as the point is filed off.

After this is done, look across the teeth lengthwise of the blade, and if the V shaped channel between the rows of teeth terminates in the centre of the blade,

the filing is good; but if it terminates at one side of the center, the full side requires more filing.

A saw of ordinary length should be kept crowning about an eighth of an inch. That is, in sighting across the points of its teeth from end to end, there should be a gradual elevation to the center, amounting to an eighth of an inch. This will counterbalance the natural rocking motion given the saw when in use.

If the saw catches and jumps, after filing as directed, it is owing to the teeth being filed too hooking, or, in other words, the points incline too much towards the small end of the saw. This can be remedied by re-filing and taking off enough to make the teeth stand upright.

In filing a rip saw, it is only necessary to carry the file in conformity to the original shape of the teeth; but it is a good plan to file the first six or eight inches, from the point, somewhat beveling. This will obviate the necessity of having to change saws when a knot is reached in splitting a hard wood plank. Simply elevate the saw, and the knot is mastered without trouble.

After filing, lay the blade flatly on a smooth board, and pass a fine gritted whetstone along the sides of the points, to remove the wiry edge and to give the teeth as fine a cutting edge as possible.

To Remedy a Kinked Saw.—When a hand saw has become warped or kinked, it should be rolled, to entirely remedy the defect, but where the tool is old, or a saw repair-shop cannot be reached handily, the blade may be benefited to a great degree by laying it upon some hard and level surface, like the face of a blacksmith's anvil, and taking a good sized round faced hammer, and striking a series of blows from handle to small end through the center. If once through does not work the desired change, repeat.

Tightening Back-Saws.—Old back-saws are often improved by hitting the end of the back-bar a smart blow with a common hand hammer.

Grease for Saws.—Animal oil is the best lubricator and preserver for the blade of a saw. Vegetable oils become gummy and should not be used. A fresh pork rind answers a good purpose.

Drills for Iron.—To do good work, and to insure utility, the drill should be no larger than the use to which it is put absolutely requires, and care is to be exercised in getting the tool of the right temper. If too soft it will not take hold, and if too hard breakage is likely to be the result. Further than this, for use upon different metals there may be a difference in temper. It is not a difficult job to put a drill in good condition. It can be done at the stove or gas jet by following the directions given.

How to Temper a Drill.—If the drill is a small one, hold it in a jet of gas, or blaze of an alcohol lamp, till a cherry-red heat appears; then dip the point, or as far up as you wish it tempered, into water or oil immediately. Then try if a smooth file will bite or file it; if it does, it must be done over again; but if it does not bite, but slips over the face without making any impression on it, it will do.

Next, clean the point or side of the face carefully on an oil-stone; then twist a piece of wire around the end of the drill, or hold the end of the drill, in pliers, in a candle or gas-light, till you see it (on the clean piece of the face) gradually turn from a light to a dark straw color; withdraw from the heat, and allow it to cool gradually.

If it goes past the dark straw color to a blue, it will be rather soft, and must be dipped in water or oil at once, or else the process gone over again. The above dark straw color will bore brass beautifully. If it is to bore steel or iron, have it as hard as when it comes out of the water or oil in the first process; but care needs to be taken with it, if very small, in that condition, as it is very brittle. Large drills can be heated in the stove.

Lubricators for Drills.—Do not use oil as a lubricator when drilling steel; water is much better. All that is required is to keep the drill cool.

A solution of camphor in spirits of turpentine is one of the best lubricators for steel tools employed for cutting, or rather abrading glass. A file moistened with camphorated turpentine acts rapidly on glass, and by means of a steel drill moistened with the same liquid, we have frequently bored holes through thick plates of glass.

NAILS AND NAILING.

Lengths of Nails.—A correct list of the lengths of different sized nails cannot be given, nor can the number contained in a pound, as different manufactories vary sizes and lengths somewhat; but the following will answer all practical purposes:

Three-penny nails, one inch long; four-penny, one and a half; five-penny, one and three quarters; six-penny, two inches; seven-penny, two and one fourth; eight-penny, two and one half; ten-penny, two and three fourths to three inches; twelve-penny, three and one eighth; twenty-penny, three and one half; spike, from four to seven inches. The three-penny are lath, and the four-penny shingle nails. Fence nails are heavier than the common cut nails. They are eight-penny, and the number in a pound varies from eighty-three to one hundred and one. Eight-penny finishing nails have one hundred and thirty to forty per pound. Shingle nails, about three hundred and fifty; and lath nails about five hundred and fifty per pound.

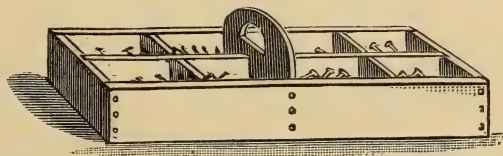
Driving Nails in Hard Wood.—Nails may be driven into hard wood by first touching the small end to grease. A piece of lard or tallow may be carried upon the boot for this purpose. When building board fences, etc., out of dry and hard lumber, the use of grease will be found an important aid.

Annealing Cut Nails.—By experiment I have found the best method of annealing nails to be heating them red hot and then dropping them into cold water. I have tried dropping them into linseed oil, but to no advantage. I have also annealed by heating and allowing them to cool slowly in ashes. By the last process they are made quite tough, but a little too tender for use in hard wood. By cooling in linseed oil the nails will not oxidize or rust, and for some uses this is an important item; but there will be found a little more difficulty in driving, as the hammer is more likely to glance from an oily head.

To Keep Nails from Rusting.—Nails for garden use or for trailing vines, where driven only part way, and subjected to air and moisture, are liable to rust. After they have begun to oxidize it is almost impossible to stop them. They should be previously prepared for the position. To make them secure against rust, mix a pint of linseed oil with two ounces of black lead, stirring until the whole is thoroughly incorporated; heat the nails red hot and steep them in the mixture. They should then be well drained and shaken up in an old nail bag until dry. The linseed oil and black lead cover them with a film of varnish which is impervious to wet. The above proportions will serve for a very large quantity.

If the black lead and linseed oil are not easily obtained, heat the nails and throw them into any coarse grease. The latter process is not so effectual as the first, but will answer very well. The grease used should not contain a particle of salt.

Value of One Nail.—One nail may prove of great value if used upon the fence or building as soon as it is demanded. A board that has become loosened soon begins to clatter in the wind, and if neglected long, it disconnects itself, falls off, and perhaps is split or carried away, and the necessary repair is increased a hundred fold in point of expense, and putting in its place another board makes an unsightly spot. It will pay richly to use a nail as soon as it is demanded.



CONVENIENT NAIL BOX.

To Make a Nail Box.—At every house there should be a nail box with several compartments, so that different sized nails and screws may be carried to any point where their uses are required.

A very good size is fifteen inches long, ten inches wide, and four inches deep. In the center have a hand piece, as illustrated, and divide the sides into four sections each. Make the box of light material—white wood, three quarters of

an inch thick, for bottom, ends and hand piece, and half inch stuff for the balance of the box, will answer. A handy nail box well supplied is a great convenience, and saves many steps when doing repairs about the premises.

To Draw a Rusty Nail.—To draw a nail from wood after it has become rusted, first hit it a blow with a hammer sufficiently hard to start it in a little. This breaks its oxidized connection with the wood. By bearing this in mind a good many little annoyances may be avoided.

FINISHING WOOD WORK.

Putty for Screw Holes.—The greatest trouble that unskilled workmen find in finishing work is to entirely remove all show of nail and screw holes. Putty, unless rightly put in, answers a very poor purpose, especially where the work is ever to be exposed to heat. Heat expands iron, and the nail or screw head will lift putty and make it show a prominence on the surface of the work.

Plugging Screw Holes.—Tacks or small nails may be driven so deep, that putty will not necessarily reach the head, leaving a vacuum for the expansion; but for large nails or screws, the plugging mode is the best. Sink the screw at least one-fourth of an inch below the surface, then square the hole, and insert a plug of the same wood precisely as that in which the incision is made, and have the wood exactly correspond; *i. e.*, the grains to run the same way. Fit the plug with beveling side, so tight that when it is driven in solid, it will not quite reach the head of the nail or screw.

Apply glue to the side of the plug before driving, and when well set, plane off the surface, and sand paper until the surface is level and smooth.

Puttying Nail Holes.—Where putty is used, it will be found an advantage to sand paper and paint thoroughly before filling the cavities, as dust of wood will partly fill the holes and prevent the putty setting in a solid bed upon the iron heads, and will be less liable to get lifted by expansion.

Another good way is to wet the wood around the nail head after it has been punched in; this will cause the broken fibers of wood to expand. After the wood becomes dry, sand paper and paint two coats before puttying, then paint over the putty before it becomes dry, and allow all to dry together.

Where large checks or cavities are to be filled with putty, the use of hot glue will greatly add to its durability. Moisten the putty with glue, just as it is inserted, and do not attempt to smooth until it is thoroughly hardened.

Cracks in Varnished Articles.—Where there are cracks or holes to be filled in plain varnished articles (*i. e.*, not painted), make some fine dust of the same kind and colored wood; mix this with hot glue until it forms a paste, and crowd the interstices a little more than full; wipe the surface of the article

being repaired, clean all around this, and let the glue dry firmly ; then rub down and polish until the surface is even. This work may be easily and nicely performed by almost any one.

Protecting Joints.—Almost every framed article or implement of wood that is exposed to the weather first shows decay and weakness at the joints, and at these places the first breakage occurs. This teaches a lesson of the importance of making good, tight joints in wood work. The closer wood fits to wood the better, but it is wise in all cases to cover the tenon of a stick, before putting the work together, with good white lead paint of the proper consistency, being sure that the shoulders get a coating also.

If sufficient paint is put in to fill and cement all space that would otherwise be left, the spot is more certainly proof against the penetration of moisture than if the dependance were placed entirely upon tight or pressing joints.

If the tenons are made to fit closely, and the shoulders come up squarely, working at the joints is less liable, of course, to take place, and the advantage of this can be readily seen. Paint applied to exposed wood work, is one of the best investments a man can make in the line of economy. Gates, lattice work, and everything of the kind, will last many years longer, if first put together as above suggested, and then kept coated with good oil paint.

Taking Out Plane Marks.—When it is desired to take out all of the plane marks from a board, three ways may be adopted. If the board is not too wide, a flat file may be used across the grain of the wood upon the surface of the board. It should be a fine file, one designed for filing iron or mill saws. Sand paper on a block used across the grain first, then lengthwise, is good, also lump pumice stone having a smooth surface.

PREPARING AND WORKING TIMBER.

The Grains of Timber.—There is something indescribable in the grains of timber that denotes firmness or elasticity, and only an experienced eye can detect the difference between the brash and the tough to a certainty. Many suppose that when the lines of annual growth are far apart, that the wood is tough, but that is not a positive indication, for I have seen white ash with the annual growths measuring half an inch when the wood was as brittle as clay. In view of this fact, it is well for every one to make timber grains something of a study, as it better enables one to make proper selections when purchasing wood articles of any kind.

Selecting Good Oak.—When selecting this wood for whippetrees, etc., choose that in which the concentric rings are close, thick, and uniform ; and has,

when cut, a glossy, varnish-like appearance, and is of a pale yellow or straw color. That which has a bluish tinge is generally tough, but is apt to be elastic or springy.

Ash is second only to oak in usefulness and durability. That which has grown on rich marsh lands is considered best.

Seasoning Timber.—The seasoning of timber may be greatly advanced by boiling it. When taken from the water do not leave it exposed to the air, for it will check. If wanted for a special use, where an extra nice finish is desired, the continued process, as given below, has been recommended: After the first boiling in clear water it should be again boiled in a solution of borax water, by which the albumen of the wood is rendered soluble, and escapes from the pores. The wood is then placed in drying chambers heated by steam, and allowed to remain three days. Wood thus treated is described as being more compact than it would be by ten years of ordinary exposure—not shrinking or warping, and being secure against decay on account of its greater density. It is more easily polished, and better fitted for articles of furniture or for musical instruments. When the wood is cooling, after being taken from the water, it should be covered, so as to prevent checking, from the action of the atmosphere, upon the surface.

To Prevent Powder-post.—Common coal oil, such as is used for burning in lamps, is claimed to be a perfect protection to timber against the ravages of worms, when applied freely. With its use, the trouble of having wood powder-posted is successfully averted.

Steaming and Bending Timber.—Any one who has even a small workshop need not be to the expense of taking broken implements to the shop of a wagon-maker or other mechanic, because bent stuff is required to make the repairs; nor is it necessary to make a steam-box, for all small pieces may be nicely bent without the use of one.

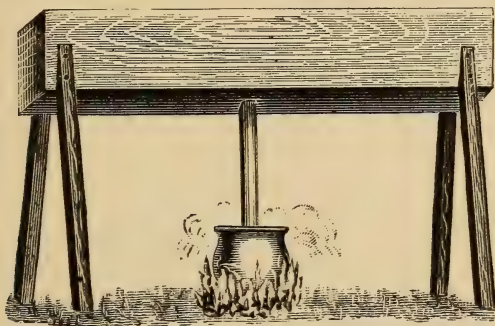
The piece to be bent should first be dressed to nearly the proper size and shape for using, and should be of good timber. This matter of quality is not only important to make the bending successful, but the best of wood should always be used in the making or repairing any kind of implement.

How to Soften Wood.—Small sticks may be made sufficiently soft and elastic by simply letting them lie in hot water for a short time. A common stove boiler answers a good purpose, and advantage may be taken of washing days with convenience.

To render large pieces of wood pliable, bury them in sawdust, and pour boiling water upon the same. A long, narrow box is the best for this purpose. Put in a few inches of sawdust, then lay on the sticks to be bent, and cover with some three inches of dust. Pour on boiling water plentifully, and let the sticks remain for half an hour. If the box is covered, the steam will be retained for that length of time with great heat from a single wetting.

Cheap Steam Box.—Where a steam box is required, it may be made by any one, and at trifling expense, as illustrated.

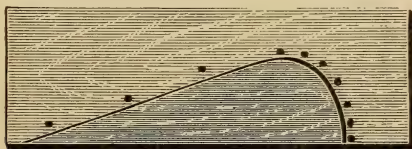
For the box, take four boards ten feet long and ten inches wide, or twelve feet long and twelve inches wide, as preferred. One end is nailed in solid, the other so as to open by hinges, or simply to take out by means of a handle, but it



A CHEAP STEAM BOX.

should be made to fit tight. Elevate this box upon legs or trestles, as preferred. Cut a hole in bottom four inches square, and nail together a square tube to fit the hole and extend down into the tight wooden cover of a common stove pot or kettle. The kettle can rest upon stones. By boiling water in the pot the box will be filled with steam.

How to Bend Timber.—To make a form to bend upon, shape a piece of plank (two-inch will do) just as you wish the concaved side of the article bent to be, and pin this upon the flat surface of a slab or poor plank, near one edge; then about two inches from the block bore a line of inch auger holes on the same curve, about six inches apart; make a set of hard wood pins to fit these holes closely, but so that they may be removed, and prepare a number of



FORM FOR BENDING TIMBER.

wedges of different thicknesses. The head pin may, however, be made stationary.

A piece of hoop iron may be used upon the convex surface to prevent the slivers rising or the grain of the timber giving away. If the hoop iron is long enough to reach the whole length of the stick, so much the better. The end of the iron may be bent over the ends of the stick and tacked there. The fitting should

be done before steaming. If the iron only reaches over the part to be bent, have a hole through the iron at one end, and with a short screw fasten it to the stick so that the ends of iron and wood will be even; then steam and bend. The lower end will be held firm at first by pin, and wood and iron will bend together, completing a nice job.

When the stick to be bent is sufficiently steamed, take it quickly from the bed or water; place the end between the pin and form; drive in a wedge to make it firm, if the pins do not come close against the wood, or hoop iron over it; then bend carefully, but quickly, around, putting in pins and wedges, if wedges are needed, as fast as possible, until the stick is closely keyed up. Let it lie in the form until it is thoroughly dry, and it will not spring back. Cross grained or green timber should not be used.

As a rule, half an hour boiling or steaming will soften a stick two inches square sufficiently to bend. Timber, that is naturally tough and flexible will require less steaming than that which is more inclined to be brittle.

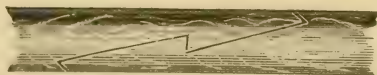
How to Splice a Stick.—By knowing how to splice one may frequently save expense and time. Timbers may be joined, poles lengthened, wagon or carriage tongues repaired, and smaller articles without number be



STRAIGHT LINE SPLICE.

spliced. The illustration will show how it is done most effectually, even better than any worded description.

The straight line method represented is easy to do, and if bolted in large articles, or glued and screwed up in light, the splice will be very strong. The second is more difficult to make, but is preferable where there is to be pulling



THE BRACING SPLICE.

upon the end. To make the latter, frame one side first and then scribe the other to it. It must be put together sidewise, and may be held by binding with wire, bolting, or having bands shrunk upon it.

Where a new piece of wood is spliced to a finished article, do not try to shape the new piece in conformity to the other until the splicing is done. Bolt, screw, or glue together, then work off the new piece into proper shape. If the bolts interfere, take out one at a time as that part where it belongs is reached, in the process of finishing, and return as fast as completed.

Splitting Timber.—To split a stick or block, begin work at the end that was uppermost in the growth. To prevent a block or plank splitting or checking

at the ends when seasoning, saturate muriatic acid with lime, and apply like whitewash to the ends. The chloride of calcium attracts moisture from the air, and prevents the splitting.

To Prevent Wood from Cracking.—It is often desirable to keep small wooden articles, such as taps and faucets, from cracking by exposure to alternations of temperature and other causes. This is best prevented, says the *Artisan*, by putting the articles in melted paraffine, and heating them at a temperature of 212° Fahrenheit, until bubbles of air cease to escape from the wood. The whole is then allowed to cool to about 120° Fahrenheit, when the articles are taken from the bath and cleaned from the adhering paraffine by rubbing with a dry, coarse piece of cloth.

Preparing Wood for Heat.—It is said that wood work that is to be exposed to fire may be made almost incombustible by soaking in water in which a small quantity of alum and sulphate of copper have been dissolved. Six ounces of each is enough for a barrel of water.

Preservation of Wood.—Common pine or even basswood may be rendered almost indestructible, it is said, by soaking in a solution composed of one part blue vitriol and twenty of water.

A French railway contractor announces a method of treating planks, etc., that greatly enhances their value. He piles the lumber in a tank, and then covers thickly with quicklime. Water is slowly added till the lime is slaked. In about a week the wood becomes impregnated, and is ready for use. Timber prepared in this way has been used in mines and other exposed constructions with good results.

Dr. Feuchwanger gives an account of experiments made by him for the preservation of wood. He says that wood boiled first in lime water, and then coated with silicate of soda, or liquid glass, will last a very long time. The mixture is fifteen per cent. alkali and ten per cent. pure sand.

Shrinkage of Wood.—People not professional mechanics have but little idea how greatly timber supposed to be seasoned will shrink. Some kinds of wood will shrink every time the surface is dressed off. Boards and planks that have been kept under shelter for years, when dressed out and employed as casing, or for making doors, will often shrink enough to form unsightly cracks at every joint. Lumber that has been sawed for several years even, should never be worked up into elegant articles before it has been kiln-dried or exposed, for at least two weeks, to the scorching sunshine and drying winds.

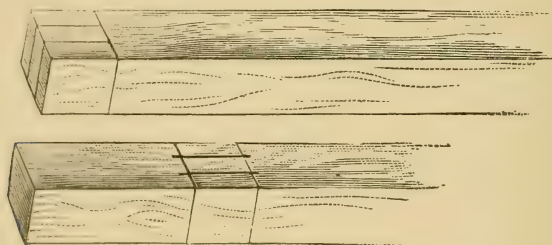
Hard Coating for Wood.—The following is the German mode for coating wood with a substance that will become as hard as stone: Forty parts chalk, fifty of resin, and four of linseed oil, melted together; to this add one part of oxide of copper, and afterward one part of sulphuric acid—the last should be added with great care. Apply with a brush while the mixture is hot.

HOW TO MORTISE AND TENON.

How to Lay Out the Work.—To lay out the work, carpenters employ what is called the double gauge, but it may be done with the single gauge; and I will try and make the process so simple that the amateur will be able to make a fair job.

First square the two sticks to be joined at right angles, and mark a face side upon each. We will imagine the stuff to be united, inch and a half thick and three inches wide. With the try-square and sharp-pointed scratch-all, or a pointed jack-knife blade, make two lines upon the surface of the stick to be mortised just as wide apart as the width of the stick to be tenoned. Do not try to measure with a rule for this; after making one line, set the stick to that, and scribe the width to a hair's breadth.

Now with the try-square carry the lines across the face edge and on to the opposite side of the stick.



MORTISE AND TENON LAID OUT.

Next, with the try-square, mark completely around the stick to be tenoned far enough from the end to allow the tenon to project through at least a quarter of an inch. Both sticks are now ready for the gauge.

Set the gauge at half an inch and mark across the double lines of the stick to be mortised, on both sides, rubbing the head of the gauge against the face edge of the stick. Next on both edges of the tenon stick, and run gauge marks connecting them across the end. Now set the gauge one inch wide and go over the same process again, and your sticks are laid out for a half inch mortise and tenon, as illustrated.

How to Beat the Mortise.—With a three-eighth bit, bore between the gauge mark a row of holes from line to line, but sink the bit only half way through the stick. Turn the piece over and bore from the opposite side holes to meet the first. Now fasten the stick in the vise, if short, if not lay it upon the bench, and, sitting close up to the bit holes, beat out the mortise with three-eighth chisel half way through, then turn and mortise from other side.

Finish up carefully with a broad and narrow chisel well sharpened, and do not work a particle beyond the marks.

How to Make the Tenon.—Next with a fine back-saw, and the stick screwed in the vise, saw the shoulders for the tenon. Run the saw slowly and carefully, seeing that it follows the scratch marks perfectly, until the gauge lines are reached.

If the timber is cross grained it will be necessary to saw down the gauge lines from the end also, but if free, split off the greater part of the sides, then bevel the edges with chisel until the bevel reaches the gauge lines, and then flatten the tenon by use of the draw shave or a sharp chisel. Now the work is ready to go together. Chamfer the end corners of the tenon a little and drive the parts up. If the shoulder is not perfect, it will be necessary to fit up with a saw.

To Saw Up the Joint.—Run the back-saw down between the shoulder, and mortise, on both sides, being careful not to go below the gauge lines. Knock apart a little to see that the shoulder is cut quite down, blow out the dust, and drive up again. This will be very likely to complete the joint.

How to Draw Bore.—After the tenon is well fitted, knock the sticks apart and bore a quarter-inch hole through the mortise, from side to side, and within an inch or less of the shoulder edge. Drive the tenon in again up snugly and with a slim awl prick a series of holes upon the tenon, through the bit hole, completely around the circle. Knock apart again and bore with same bit at the point where the awl marks are made, but an eighth of an inch nearer the shoulder. Now put the work together to stay.

Make a pin three or four inches long, of tough, hard timber, well tapered, and of the right size at upper end to fit the bit hole tightly, and drive this in. It will draw the shoulder up firmly. It is well to assist it by placing a block alternately each side of the end of the tenon and hitting it smart blows with a hammer as the pin is driven.

Where the tenon stick is to stand at a corner, but a half tenon is to be made, that is half the width, there being three shoulders made, one on the edge, and the mortise half the length of the other.

HINTS ABOUT SCREWS.

How to Select Screws.—When buying screws, notice what you are getting, for there are poor, as well as good kinds. See that the heads are sound and well cut, that there are no flaws in the body or thread part, and that they have good gimlet points. A screw of one make will drive into oak as easily as others into pine, and endure having twice the force brought upon it.

Screws vs. Nails.—A good supply of screws, of various lengths and sizes, should be kept, for in very many places where nails are commonly used screws would be very much better. Screws will hold two pieces of wood more rigidly than nails; and if the timber should shrink a trifle, the screws can be turned tight; whereas it is difficult in most instances to tighten loose work with nails in places where there is an unusual strain on the parts to be held together. By the gross they can be purchased very cheap, and in the long run, found no more expensive in many places than nails.

To Make Screws Hold.—Screws may be made to hold in soft wood or where the cut has become too large, by the use of glue. Prepare the glue thick, immerse a stick about half the size of the screw, and put it into the hole; then immerse the screw, and drive it home as quickly as possible. When there is some article of furniture to be repaired, and no glue is to be had handily, insert the stick and fill the rest of the cavity with pulverized resin; then heat the screw sufficiently to melt the resin as it is driven in.

In broken plastered wall the best plan is to enlarge the hole to about twice the diameter of the screw, fill it with plaster of paris, such as is used for fastening the tops of lamps, etc., and bed the screw in the soft plaster. When the plaster has set the screw will be held very firmly.

To Start a Rusty Screw.—First clear the cut in the screw head, and see that the driver is in good condition; then place the whole strength upon the instrument, and give quick, earnest turns upon the driver handle. If it does not start then, place a nail punch upon the head and give it two or three smart blows; if it still resists, hold a hot iron upon the head until the screw is well heated, and the desired result will almost invariably follow.

To Prevent Screws Rusting.—If screws are warmed and dipped in melted tallow or raw linseed oil, it will prevent their rusting, and they can always be unscrewed with ease. A large quantity of screws can be greased in a few minutes, and the operation is one which will result in a great saving of time and labor.

USES OF RIVETS AND BOLTS.

Carriage Bolts.—As a common thing, carriage bolts are better to use about the premises than rivets, and yet there are places where bolts will not answer, on account of the prominence of head and nut.

Why Rivets Give Way.—People are very often bothered by the breaking or slipping of rivets in machinery and other places, and do not know a remedy. The trouble usually arises from the rivet hole in iron being too sharp upon the edge, and from the rivet head being too flat upon the under side.

The most of the heading tools used by blacksmiths in rivet making are rounded on the surface, so that the under sides of the heads are left concave. This brings the outer edge of the head upon the surface to which it is to be drawn, and the rivet has a chance, when brought to a heavy strain, to extend a little, which will prevent breaking.

The rivet is usually made of softer iron than that upon which it is to be headed down; consequently, if the edge of the rivet hole is left sharp, when the tension comes, the soft iron is cut away by the harder edge, and the work loosened.

To Make Rivets Hold.—Countersinking the hole upon the surface is the only remedy to be used in the last case spoken of, and but little of that need be done; a common countersink, which may be bought at any hardware store for ten or fifteen cents, or the home-made one illustrated on page 16, and used in a bit-stock, is all that is required by way of tools. Rivets subject to a shearing or side-way strain, do not require this caution, as they then only need heading enough to keep the work in place.

Pressed vs. Forged Rivets.—The pressed, or “sale rivets,” are not as good as those made at the anvil; at least, I have never been able to find any equal to the home-made, and would therefore advise that where iron work is to be put together, or wood upon iron is to be secured in safety, that the workman go to some good blacksmith, and have the rivets made of tough, soft iron, such as nail-rod or Swedes iron; and see, too, that they are made as they should be.

Rivets for Hoops.—Rivets of any desirable size or length, for riveting hoop iron, sheet iron, band iron, or anything else where a bolt could not conveniently be used, can be obtained for about ten or fifteen cents per pound; and a few rivets, with a pound of hoop iron, will save many a dime, and even dollars, in hooping pails, tubs, etc., which would otherwise fall to pieces and be worthless.

Tire Bolts as Rivets.—Where iron is to be fastened to iron, or to wood, and a smooth surface must be kept upon one side, tire bolts may be used with the heads sunken to a level with the surface, by use of the countersink.

Tire bolts, neatly made from one inch to three inches long, can be purchased for a trifle, and they are neater, truer, and have a nut fitting better than any blacksmith is able to make by hand.

How to Put in Bolts.—The hole bored for a bolt should be so small that the square portion of the bolt will drive in firmly enough to prevent turning when screwing down the nut. Nothing is more provoking than to get the burr half way down the thread, and have the bolt turn. The nut can neither be screwed down nor removed without a good deal of trouble.

If obliged to use a bit too large, from not having a smaller one, put a piece of hard wood on the sides of the bolt, so as to make it drive firmly.

Do not screw a nut tight enough to crush the wood by the squeeze of

the bolt. When you draw until the head sets below the surface of the wood that moment you commence destroying the fiber of the wood and aid the premature rotting at that one point; for, no matter how nicely painted or how neatly puttied up, there will soon be a cavity for the retention of a few drops of water.

To Remove a Rusty Nut.—Place the head of an ax or other solid substance on one side of the nut, and give a few smart blows with a hammer on the other. Or hold an ax against one side, then place a cold chisel as you would to cut the nut through to the bolt; give a few light taps on the chisel which will expand and loosen the nut without injuring it.

Wetting with spirits of turpentine or coal oil will also be a benefit. Short, sudden jerks upon the wrench will have a better effect upon the nut than steady pulling.

MITER WORK.

To Make a Miter Box.—A miter box is handy for making right angle joints in place of framing pieces together, as for instance, joining picture frames, either in making new or cutting down. The box is easily made. Take a piece of board eighteen inches long, about one inch thick, for bottom, and two side pieces same length and thickness, four inches wide. Nail the two narrow pieces upon the edges of the bottom piece, and it is ready to be laid out and cut.



THE MITER BOX.

If the open box is just six inches wide, measure three inches from center of each side piece, and then draw cross lines as represented in cut. Line down the sides by use of the try-square, and then saw down upon these lines until the bottom board is reached. This sawing should be carefully done. The miter box is now complete.

To Saw a Miter.—Place the stick in the box with the edge held firmly against one side of the box, and run the saw down in the kerf until the stick is severed. By sawing two sticks thus, you make a miter of perfect right angle. This one box will answer for cutting frames of any size, whether they be six inches square or six feet square, or one foot wide and six feet long. The essential thing to observe is to have the two saw kerfs, inside of the box, exactly as far apart as the box is wide inside. If the work does not fit snugly from the saw being too coarse, a smoothing plane will remedy it. The back-saw is the

best tool for cutting miter joints. The box may be made of any width or size, but the rule of keeping distance between saw cuts equal to the width must in all cases be observed.

Miter Fastening.—An English inventor has produced a process for holding corners which may be used for heavy as well as light boxes. The two pieces of wood to be fastened together are first mitred in the ordinary way, and a hole is then bored in each piece vertically from the top downward, at a short distance from the mitred edge. A channel or groove is then cut by a saw or otherwise from the mitred edge to the bit hole.

This channel is of less width than the diameter of the hole, and may be cut either parallel to the sides of the piece of wood or at right angles to the mitred edge, so that when the two edges are put together, there shall be a continuous channel from one side to the other, shaped somewhat like a dumb-bell, and running from the top to the bottom of the box.

A key is formed by running a fusible metal, such as lead, into this channel. The key may be made separately of solid metal and driven into the channel; but, in either way, a joint is formed which can be broken only by tearing away the mitred edges of the wood.



CONSTRUCTION OF HOUSES.

Simple and Convenient Plans.—I do not propose in this book to attempt to instruct the non-professional in the art of house building, but to simply give a few hints to those of limited means, to be observed when erecting a house. Those who are able to employ an architect, can obtain plans far more elaborate than can be given in a work on simple mechanical affairs.

A practical builder who has made a study of cheap and yet handsome dwellings, furnishes Plan No. 1, page 40, which has many commendable points.

The upright part is 20 by 36 feet; the wing on the right, 17 by 18; wing in the rear, 20 by 30 feet.

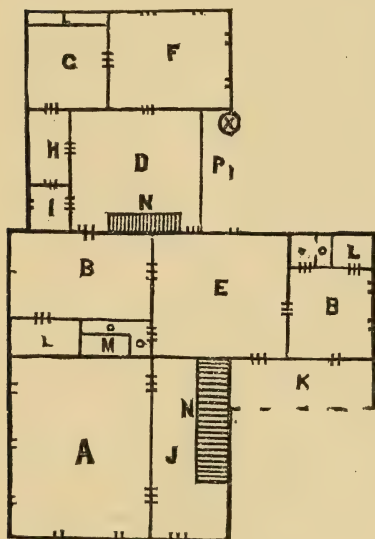
The plan of the ground floor only is given. A, the parlor, 16 by 19 feet. B, bed-rooms; one in wing, 9 by 13 feet; in upright, 12 by 16. C, pantry, 8 by 9. D, dining room, 15 by 15. E, sitting room, 17 by 19. F, cook room, 12 by 15. H, cistern and pump room, 5 by 10. I, bath room, 5 by 8. J, hall, 10 by 19. K, front porch, 4 by 18. L, closets. M, china cupboards. N, stairs. O, clothes presses. P, rear stoop, 4 by 18; with a cistern at the further end.

The woodshed should be attached to the back end of the rear wing, adjoining the cook room or kitchen, and made of such a size as the builder may choose. The back wing may be built forty feet long, leaving ten feet for a woodshed, if desired.

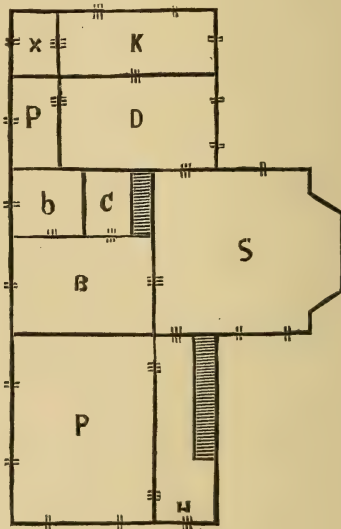
A residence after this plan can be built and very well finished for about seventeen hundred dollars.

Of course the exact cost cannot be safely estimated, for the expense will depend much upon location. In some localities, the cost will be considerably less, and in others possibly a little more.

Plan No. 2 is less expensive, and a little more tasty. If one can get along with the room it affords, it should be built story and a half, with studding long enough to make good high walls on second floor. H represents hall; P



PLAN NO. 1.



PLAN NO. 2.

parlor; S, sitting room; B, bed room; D, dining room; K, kitchen; C, closet; b, bath room; P, pantry; X, storage room. There are front and back stairs.

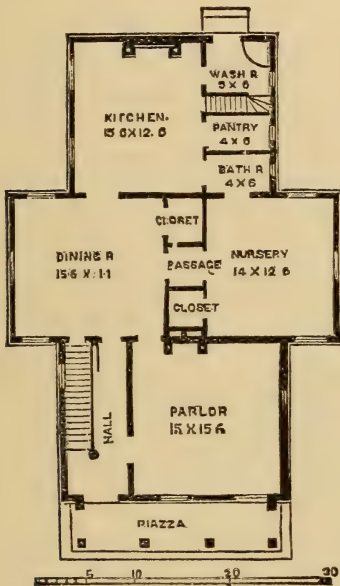
The dimensions may be the same as the other, leaving off nine feet for the wing bed room; or the whole dimensions may be lessened to suit the financial requirements. The chambers can be constructed to conform to space.

Plan No. 3 given may please some better.

The main part is 22 by 46 feet, with piazza in front. The cottage is entered by means of a hall containing the stairs. To the right is a parlor fifteen feet square; back of the hall is the dining room, 14x15-6, with doors between both hall and parlor. Back of the parlor is the nursery, 12-6x14, and two closets between this and the dining room. Off from the dining room to the rear is the kitchen, 12-6x15-6, and on the right, pantry, bath and sink rooms, and in the latter are the back stairs. The entrance to the cellar is from the kitchen.

The second story is divided into bed rooms and closets, as shown in the design, and made very pleasant and convenient, giving large apartments for sleeping in, which should always be sought when building a residence.

In arranging your plan, it is well to remember that doors which are used most in passing through a room should be opposite one another, and not cross cornered. The front windows should be arranged symmetrically with respect to the outside partitions, inside be made to suit.



PLAN NO. 3.—GROUND FLOOR.



PLAN NO. 3.—SECOND FLOOR.

Do not have a step between two rooms on the same floor; put them all into the stairs between stories.

One almost invariably finds the stairway leading from the kitchen to the cellar or laundry only wide enough for one person. If there is any part of a house that should have a broad, easy stairway, it is that part which is used the most, and where it is necessary daily to carry bulky materials up and down.

Seasoned House Material.—In what we call good houses, those parts exposed to view are generally of good stock and properly seasoned; but a dry frame is of more consequence than dry doors. The latter can be readily repaired or replaced; the former cannot. The timber used is generally too narrow. Every wooden house of medium size should have 2 by 6 outside studding, instead of 2 by 4. Instead of 2 by 6 and 2 by 8 flooring joists, they should be 2 by 10 and 2 by 12.

Double Boarding for Houses.—A correspondent says that all framed houses should be double boarded; but the rough sheathing boards should be put inside the studding, instead of outside next the siding, as has been customary. Then on this sheathing, inside the studding, strip with a single lath wherever we wish to nail the lath; then the clinch of the plastering will touch against the solid sheathing board, and make a very solid wall, not so easily broken as when there is nothing but the slender lath to hold against a knock on the plastering.

Quantity of Material in Buildings.—According to the *Northwestern Lumberman*, 1,000 laths will cover 70 yards of surface, and 11 pounds of nails put them on. Eight bushels of good lime, 15 bushels sand, and 1 bushel hair make enough good mortar to plaster 100 square yards. A cord of stone, 3 bushels lime, and a cubic yard of sand will lay 100 cubic feet of wall. One thousand shingles laid 4 inches to the weather, will cover 100 square feet of surface, and 5 pounds of nails fasten them on. One fifth more siding and flooring is needed than the number of square feet of surface, because of the lap in the siding and the matching of the floor. Five courses of brick will lay 1 foot in height on a chimney; 6 bricks in a course will make a flue 4 inches wide and 12 long; and 8 bricks in a course make a flue 8 inches wide and 16 long.

Repairing Buildings.—Hardly any building is so good that no attention, in a mechanical line, is needed. An absent shingle upon the roof should be replaced as soon as discovered, for if not, leakage and decay are sure to follow. Where a shingle has been removed by wind, it may be known that those immediately above and below are not securely nailed, and soon a breach of considerable magnitude will be made.

Another important thing to notice in connection with the roof, is the condition of the ridge boards. Hundreds of outbuildings and many residences may be seen with these entirely, or in part gone. The opening not being large, but little snow or rain falls through, and does not attract particular attention, but yet the moisture so completely penetrates here, that the ridge pole, ends of the rafters and roof boards decay. One hour's work a year will keep everything as it should be.

When the weather boarding of buildings gets to clattering, it should be nailed up at once. The best way is to take a hammer and pocketful of nails and give each building a looking over, twice a year, say fall and spring. When a board is allowed to drop off, it soon warps up or splits in such a way as to be unfit to replace, and new lumber has to be used to make the repair.

Lining for House Walls.—A very good plan has been adopted by some for making framed houses warm in winter and cool in summer. The plan consists in building up a brick wall between the studs of the house. This wall is only two inches thick, as the bricks are built up standing upon their edges.

Strips, half an inch square, made by splitting laths into three parts, are nailed

to the studs three inches from the face side, then a layer of brick is put up edgewise, resting against the cleats, and cemented together, sides and ends.

A double air chamber is thus formed, besides the wall will be rat proof.

A plan a little less expensive, and one that will answer about the same purpose, is to nail inch cleats up the studding on the broad surfaces a little back from the center, lath upon these and put on a coat of strong plaster, what masons call a "scratch coat." The cleats for this purpose should be at least an inch square. Of course this inner wall must be made before the lathing is done for room finish.

Building Brick Walls.—When putting up brick walls for houses, there are two very important matters to be considered. First, how to prevent dampness; and second, to have a sightly and durable structure.

When dry bricks are laid in the mortar, as quick as a flash they will absorb the moisture and prevent cohesion, insomuch that often the bricks can be separated from the mortar as clean as if they had not been laid in it. Bricks of inferior quality will make a tolerably good wall if dampened and laid in good, sharp sand mortar, and whoever wishes to put up a good, substantial building, should be careful not to let warm and dusty bricks be built in the walls, unless first dampened with water.

To Prevent Damp Walls.—The work of prevention should begin at the foundation. Look to thorough drainage, and then to prevent the retained moisture of the earth rising by capillary attraction. The remedy for this, as given by the *Manufacturer and Builder*, is a layer of fine concrete, thinly coated on the top with asphaltum laid on hot. This done all around the top of the walls, external and internal, the piers and every piece of brick work that in any manner has connection with the ground, then the bricks forming the next course should be heated over charcoal furnaces, and their beds dipped in the asphaltum before being laid. It is evident that a preventive course could thus be formed above ground at a trifling expense, wholly impervious to wall-damp, and at the same time giving a bedding to the superstructure of a quality very far superior to any now in use.

Now, something must be done for the wall above the foundation. Brick will absorb fully one fifth of its weight of water, and where the storm drives the rain continuously against the face of a wall for a sufficient time to permit the interior heat to attract it, the inside of the wall must of necessity be damp, and the papering become mouldy, as well as the ceiling next it rotten. To prevent this, various means have been devised, and while leaving a space between the bricks and the plastering, apparently making the interior dry, there is a heavy dampness existing after a long rain, which neuralgic and rheumatic people feel very sensibly.

Among the preparations for the outer wall to prevent water penetrating, are the following :

Twelve ounces of mottled soap are dissolved in one gallon of boiling water, and the hot solution spread steadily with a flat brush over the outer surface of the brick work, care being taken that it does not lather; this is allowed to dry for twenty-four hours, when a solution formed of a quarter of a pound of alum dissolved in two gallons of water, is applied in a similar manner over the coating of soap. The soap and alum form an insoluble varnish, it is said, which the rain is unable to penetrate, and the cause of dampness is thus effectually removed. The operation should be performed in dry, settled weather. Another method is to use eight parts of linseed oil and one part of sulphur, heated together to two hundred and seventy-eight degrees in an iron vessel. The former appears to be preferable.

Painting the brick work is efficacious, but has to be repeated, and in the end is apt to make brick work little, if any, cheaper than brown stone. In all these cases we are supposing the locality of the work to be very exposed, as are a great many valuable residences, located in rural districts, country towns, and in the suburbs of cities.

As to the inside walls, there are various ways of coating, but painting is the most commendable. Use white lead and linseed oil, with a little litharge to facilitate the drying, mixed together to about the consistency of thin cream; a coating of this being applied, the oil from it is drawn into the plaster in a few hours, leaving the white lead apparently dry upon the surface. In the course of a day or two, when this coat has sufficiently hardened, another should be given a little thicker. If the absorption of the oil from the second coat has not been great, about one fourth of spirits of turpentine is added to the third; but where the absorption has been great, a less proportion of spirits of turpentine is used. Into this coat the coloring ingredients may be put, which are to bring it near the shade of the finishing coat.

The flatting or finishing coat is composed entirely of paint—that is, of white lead and the coloring ingredients mixed together and ground in oil into an impalpable paste. This mixture is of a very thick consistency, and must be thinned with spirits of turpentine until it will flow easily from the brush.

Sometimes a brick wall is carried above the roof and painted just for appearance' sake on the outside, and here we find the paint flaking off. On the inside the rain will enter, saturate the bricks with water and force off the paint. The water will run back on the under side of the copestones until it is absorbed by the mortar. Let it be borne in mind that, if rain is not entirely excluded from the bricks, it will be of little use to paint the outer surface only.

Rubbing Down Bricks.—When common brick is used for the outside facing of the house, it may be well rubbed down with brick and a free use of cement water. This fills up all the interstices, and produces an even surface upon which to paint. Soft brick should not be used for outside when it can be avoided.

Hollow House Walls.—In hollow walls there is very likely to remain a heavy dampness after a long rain, either from capillary attraction through the foundation, or by absorption from the surface. Of course this is when such precautions as have been given before, have not been taken. The great difficulty met with in building hollow walls, is to so construct them that moisture cannot pass from the outer to the inner wall. *

Wall Binders.—Binders of some kind must be used, and these are commonly of brick, which answer as a vehicle to transmit the dampness. Strips of wood or iron have been used in place of brick, and with good effect. Common hoop iron, or pieces of lath will make ties, if they are firmly cemented between the layers of brick.

As to the best method, the *Scientific American* says: The proper way to construct a hollow wall is to have 8 inches of brick work on the outside, then two inches and a half of hollow space, and 4 inches of brick work on the inside. Bind the outside and inside walls together with iron ties, $\frac{3}{4}$ by $\frac{1}{4}$ inch, and $10\frac{1}{2}$ inches long, with a turn of one inch at each end. These ties should have a good coating of tar, and should be built in the wall every eighth course. They should be two feet six inches apart, and so placed as to break joints.

Openings should be left at the bottom of the walls on a line with each tier of beams, to allow the dropping mortar to be taken out; otherwise the droppings accumulate, and produce a solid wall. To more effectually collect the droppings, a course of slate should be placed over the hollow space in the wall, on the top of the beam; this should be done on each floor. Where this mode of construction is faithfully carried out, a very satisfactory wall is sure to be the result.

Do not permit the mason to persuade you to allow him to put in a binder of brick occasionally so as to "steady the wall;" so sure as you do, a damp spot on the inside plastering will be the result.

Pointing Brickwork.—As in laying walls, pointing should not be done upon dry bricks. Jobbers will ridicule the idea, perhaps, but there is always a mercenary motive behind it. Mortar to be tough and hard should dry slowly. In the first place, prepare the pointing material of clean, fine, sharp sand, two parts to one of cement, then add a little white lime to make it work nicely, and to make it white. Mix only a little at a time, and apply at once. If the material stands long, it sets so that it cannot be worked.

The best time to point a wall is just after a good, soaking rain. If the wall is dry, make a generous application of water to the bricks. Some masons simply dampen its seam with a wet brush; but this is not sufficient. Roughen the seam before applying the cement, to give a firm hold to the pointing material.

Bricks per Foot.—Twenty-one bricks may be counted as one cubic foot. For surface measure on a wall, thirteen and a half bricks make a foot, and for

a sixteen inch wall, twenty-seven bricks make a surface foot. By following these rules one can calculate very closely upon the number of bricks necessary to construct a house or other building.

Concrete Walls.—If sand and cement are what they should be, concrete wall may be made very desirable. The *Scientific American* says on construction, that the mortar should be made of cement and sand (the cement fresh from the kiln and tested as to its setting quality) ; and the sand should be sharp quartz, perfectly clean and free from loam.

Clean sand will not soil the hand. Sand may be freed from loam by washing. Place the sand in a shallow box 4 or 6 feet square, or larger, and flood with water, stirring the sand with a hoe. The loam will discolor the water and flow off with it. Keep stirring and flooding until the water runs off colorless. The sand is then clean.

Combine the dry cement with the sand in the proportion of one of cement to two of sand, thoroughly mix them dry, and just before use add water enough to make a thin paste. To this paste add the gravel and small stones, and stir them about until the surfaces of the gravel and stones are all covered with the paste, taking care that no more of the stone filling is added than the paste will coat.

The mass, thoroughly compounded, should be immediately carried and deposited within the boxes upon the wall, and the boxes allowed to remain until the concrete is set. The time for setting will depend upon the quality of the cement, but ought not to exceed from six to twelve hours.

The proportions between the cement and sand should vary in accordance with the quality of the sand, from two to five measures of sand to one of cement. There should be enough cement to coat the sand on all its surfaces.

Concrete is not quite as good as stone for foundations. The quantity of gravel used will depend upon its coarseness, usually about twice as much gravel as sand. It is better that the gravel be of various sizes. The resultant concrete will measure no more than the gravel ; the cement and sand are lost in the interstices between the stones.

Color for Brick Houses.—When bricks are used of a lively cherry red, instead of a deep, dark hue, and the walls are properly constructed, painting is not necessary. Of course the structure is aided in its beauty by stone cappings and colored pointings. For cottage residences, and small villas, it certainly produces a fine appearance to leave the brickwork in its natural state, having the joints pointed with blue or dark mortar. When to this is added a few graceful creeping vines, tastefully trained upon the walls, a very picturesque and rural effect is obtained.

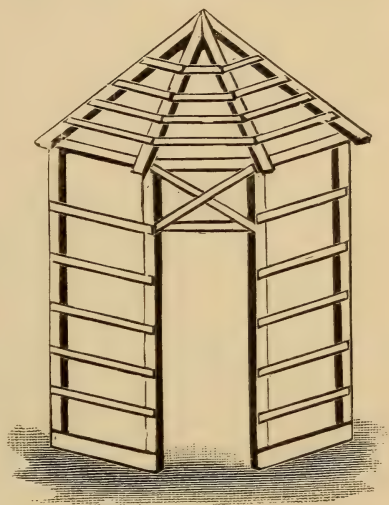
If the bricks are not of a desirable color, they should be rubbed down until a good, smooth surface is obtained, and after painting a pleasing shade, striped with dark paint.

CHEAP SUMMER HOUSE.

Material Required.—A summer house quite ornamental when vine clad can be erected at little expense after the plan given in the illustration. All the material required are a few scantlings and light slats. Eight posts are required and as many rafters, all of same sized material. The posts may be set in the ground, or better upon a scantling foundation, with a gravel floor. Six feet in diameter and eight feet high, will answer for a small arbor.

Octagon Foundation.—To lay out the foundation for an octagon summer house, strike a circle the size desired, and then divide that circle into eight equal parts, by spacing around. Have a small stake for center guide; then place stakes at each of the eight points, having the distance the same from each of the eight and the center stakes. If a scantling foundation is to be used, place a piece of board, same width as the bed piece or the scantling itself, against two of the stakes on outside of circle; then with string, or a straight-edge, strike a line across the board or scantling from center of circle to outside, and saw ends to the line mark, and this will make the pattern for cutting all of the eight pieces. These, when spiked together, will make the sills. Eight more pieces of lighter material, but same width, spiked together will make the plates or upper part of the octagon. Plant a creeping vine like wistaria or trumpet vine on each of the sides excepting door way, and soon you will have a pretty, cool summer retreat.

A Rustic Summer House.—Where one has access to a forest, a rustic summer house may be built at less expense than the one above described. Instead of using scantling for posts and rafters, use poles which retain the bark. The framework should be put up octagon in shape, and after the manner illustrated, and instead of the cross cleats, use crooked limbs, cut to form diamond shaped openings between the posts. Limbs from the tops of large trees are best, as they are more likely to be angular. After the posts are set, a saw, hammer and nails are all the aids required. In the construction, one has a good opportunity to display the innate taste. This house may also be vine-clad.



CHEAP SUMMER HOUSE.

ROOFS FOR DWELLINGS.

Best Shingles.—The best material for shingles is white pine of large growth, and the best make, those that are split and shaved. When shingles are sawed or cut the grains are crossed, and water more readily penetrates than when they are shaved lengthwise of the grains. For durability, next in order come hemlock, spruce, white ash and oak.

Spruce, if the timber is large, and the sap all taken off, will last fifteen or twenty years; but shingles made of small spruce, or fir timber with sap on, such as are imposed upon the market, are comparatively worthless.

Much depends also upon the quality of the timber, and the condition it is in when cut. White oak will make good shingles. This statement is based upon actual trial and observation. I had a building newly covered for the first time that had stood over thirty years with an oak roof. Another oak roof, put on ten years later, did not stand well. The latter shingles were made from dead but sound trees, and the former from live oak.

Thin shingle are more likely to warp than thick ones, and do not wear proportionately as long. When buying shingle of any wood, select those that were made from live timber, fine grained, and of good thickness. It is no small job to new roof a building, and it pays well to do the work right.

Painting Shingles.—There is no more question in regard to the profit of painting shingle, than there is respecting the economy of painting any part of a house exposed to the influence of storm and sun heat, but the work should be done thoroughly. Some paint both sides of the shingle, and those that have had most experience, declare that if good shingles are painted on both sides, and good paint is applied to the roof once in ten years, it will continue leak-tight for more than a hundred years.

Care should be taken to apply the paint when the shingles are perfectly dry and seasoned, for to do so when wet would, by preventing the escape of the moisture therefrom, only hasten their destruction. The paint should, of course, be of a color to correspond with that naturally assumed by shingles after exposure to the weather, in order that anything unsightly or grotesque in the appearance of the roof may be avoided.

As black paint absorbs more heat than any other color, neither the paint nor the shingles will endure as long as if the roof had been covered with some light wood-colored paint.

Tar For Preserving Roofs.—Those who have experience say that the durability of shingles may be doubled by dipping them into gas tar and rosin—boiled to a pitch—while the mixture is hot. This substance fills all the pores of the wood so perfectly as to make the shingle impervious to water; in fact, they are claimed to be next to slate in point of durability as roofing material.

When it is not desired to save the water for drinking, coal tar is an excellent and cheap paint for preserving shingles, and it will pay well to smear a roof with this material once in four or five years.

Nailing on Shingles.—Some writers have advocated using but one nail to a shingle, so as to give the piece of wood a chance to swell and shrink without liability of splitting, but the theory is not a good one. I once employed a carpenter who advocated the same thing, claiming it was not only economy to use but one nail, but that the roof would last longer. We were new roofing my residence at the time, and the portion of the roof put on by him was laid after his theory; the other portion was well nailed. The result was, not five years elapsed before the half nailed shingles began to work loose and blow off, and the roof to leak—in fact, it was in worse condition at that period than the other part at the end of fifteen years.

Good shingles are not liable to swell or warp enough to split where the nails go through; in fact, we seldom see them, of any kind, thus affected. Sixteen inch hand shaved and painted pine shingle, laid four and a half inches to the weather, well nailed down, will last until the wood wears away, which will reach well on to half a century.

Lime for Shingles.—A New England gentleman claims that shingles laid in whitewash will last twice as long as if they had not been treated with the lime. His plan is to dress the shingles in thin whitewash made with brine instead of clear water. He lines each course of shingles as laid with red chalk, then whitewashes the last course laid down to the line, and after the building is shingled the whole roof is whitewashed. He speaks of a roof covered with sappy and shaky shingles that had lasted twenty years, and would last several years longer.

This process no doubt will better the condition of the shingle somewhat, but, in my opinion, nothing is equal to linseed oil paint well applied.

White Vitriol for Shingles.—Another process offered and strongly advocated by some, is to use vitriol and alum.

Take a kettle, or a large tub, and put into it one barrel of lye of wood ashes, five pounds of white vitriol, five pounds alum, and as much salt as will dissolve in the mixture. Make the liquor quite warm, and put as many shingles in it as can be conveniently wet at once. Stir them up with a fork, and when well soaked take them out and put in more, renewing the liquor as necessary. Then lay the shingles as usual.

Number of Shingles in a Roof.—There are two easy methods of calculating how many shingles are required to cover a roof of given size. One is to figure upon twenty square inches cover to each shingle, and the other by finding the number of square inches in one side of a roof; cut off right hand figure and the result will be double the amount required for that space, or enough for both sides of the roof.

To illustrate first process: The measurement for a shingle is four inches wide; if the roof is fifty feet by fifteen, it will take one hundred and fifty shingles to make one course, three per foot, and in fifteen feet the other way, we have twelve times fifteen, or one hundred and eighty inches; shingle, five inches to the weather, will require thirty-six courses, and thirty-six courses of one hundred and fifty each, will use up 5,400 for one side, or 10,800 for both sides.

By the other process, multiply width, fifteen feet, by length, fifty feet, and the result is seven hundred and fifty square feet. Now multiply the square feet by one hundred and forty-four, to reduce it to square inches, and you have a result of 10,800; strike off right hand figure, and the result is enough shingles for both sides of the roof.

To Repair a Roof.—When repairing a shingle roof, paint should be mixed to correspond with the color of the weather-beaten wood, and when a new shingle is put in, paint the same. A spotted roof is always unsightly. To cement holes in any kind of a roof, take four pounds resin, one pint linseed oil and one ounce red lead; simmer together and apply while hot.

Coloring Zinc Roofs.—Among recent German inventions is a simple process, depending on the use of acetate of lead, by which every kind of color is applicable to sheets of zinc. By mixing black lead, for instance, with the salt, a very agreeable light brown hue is obtained. It is by this process that the cupola of the synagogue at Nuremberg has been painted. A sufficient length of time has already elapsed, it is said, to show that the atmosphere has had no influence on the zinc sheeting of the roof, thus showing the practical value of the process in such cases. By the addition of other coloring matters, light or dark shades of yellow or gray may be produced.

CONSTRUCTION OF CHIMNEYS.

Cement for Chimneys.—There are some few hints essential to the proper construction of a chimney. For safety, the mortar should be strong and adhesive, and the "pointing up" done as well on the inside as out. Another essential thing is to have the brick wet when the top at least is laid. A dry and warm brick absorbs the moisture from the cement very rapidly and leaves it brittle. Lime mortar, to retain its best strength, should dry slowly. This fact is not sufficiently heeded when laying brick which are to be exposed to wind and storm.

Another thing neglected by masons is the filling of the space between the ends of the bricks perfectly. Simply drawing the trowel across the edge of the brick last laid, and shoving another up against it, is not sufficient. Very many

of the so called incendiary and unaccountable fires arise from imperfectly built chimneys.

Topping Out a Chimney.—Where a covering is desired at the top, it may be made of stone or brick. Sheet iron is not durable enough to pay for using. A chimney top arched with brick or stone, well cemented, will stand the weather for half a century.

Size of Chimneys.—If but one stove is to be used in a chimney, a flue the size of two bricks will be sufficient to carry off the smoke. For two stoves, have space equal to four bricks. If to carry off the smoke of four or five stoves, it should contain one hundred and sixty square inches. This may be square, or long and narrow, as best suits the convenience of the builder, but above the roof, the best proportion is to have the chimney twice as wide as it is thick.

Smoking Chimneys.—Smoking chimneys are the result of various causes. First, the chimney is not tall enough; second, not properly constructed at the arch or the flue is clogged; third, openings along the structure which lessen or destroy the draft from the point desired; fourth, the narrowing of the flue at the top; fifth, by partitions in the chimney.

The chimney should be tall enough to out top any roof-ridge or wall near by. The throat should be large enough, if a fire-place is used, to allow free escape. If a stove is used, and the pipe enters above the throat, the latter should be filled by fitting in a board and cementing around the edges. A coating of cement or a sheet of zinc should be put upon the upper side of the board to prevent the liability of its burning from falling sparks or ignited soot. The flue should also be kept clear. Sometimes too many openings in a chimney prevent a good draft from any single point. To obviate this, close the openings when not filled by pipes, or keep the dampers turned in those not in use.

Wire Gauze for Smoking Chimneys.—A correspondent recommends wire gauze, of from thirty-six to forty wires to the inch, as a screen blower, or guard. He says if judiciously applied to register stoves, ranges, or stove doors, little, if any, smoke will come into the room.

The atmospheric pressure prevents the smoke entering the room through the gauze, and if applied immediately to the front of the fire, more smoke will be consumed than by any other means. In that case, the wire should be kept two inches from immediate contact with the hot fire.

Narrow Flue in Chimneys.—If the flue is narrowed at the top, the tendency is to drive the smoke back. Smoke, as it cools, moves with less force than when hot, and meeting with a partial obstruction, returns, especially if the atmosphere is in such a condition as to make downward pressure.

If any thing, the upper portion of the flue should be a trifle larger than the lower, at least no smaller. Sometimes the division of a chimney by a wall, will cause smoke from one flue to pass up on one side and down on the other, acted upon by some influence in the apartment where the second opening is made.

To remedy this, remove a portion of the wall at the upper end. Location has something to do with the correct action of a chimney. A house built upon an elevated piece of ground will not require so large a flue in its chimney as one built in a ravine or valley.

Burning Out a Chimney.—As a remedy for a chimney on fire, two articles have been suggested. Brimstone thrown upon the fire on hearth or in stove is one, and salt the other. The latter is usually most convenient. It is claimed that if salt is mixed with the mortar which is used in building the chimney in the usual way, the accumulation of soot is prevented by the salt absorbing the moisture every damp day, and parting with it, to the soot, which thus becomes heavy and falls down into the fireplace.

FIXING UP DOORS.

Neglected Repairs.—Doors become unsightly from neglect. A screw comes out and is not replaced; there is a sagging, and no remedy applied; a piece of moulding comes off, and instead of being at once put back and fastened, it eventually gets lost, and then the unsightly door is a permanent thing. But little attention is required to keep all the doors of a dwelling in good working condition as well as agreeable in appearance.

Slamming Doors.—Where doors are so located as to be subject to strong draughts of air, and to slam, they should have rubber or cloth pads applied to prevent the noise; strips of rubber cut from the thin part of old shoes, or thick pieces of woolen cloth, may be glued or tacked on to the jamb casing. It is not necessary to put them on its whole length, a strip three inches long at top, bottom and middle will answer.

Sagging Doors.—Doors long in use often rub the floor or pinch at the threshold, and have to be planed off. This is a bad practice, because it injures the shape of the door. Instead of this—if modern hinges are used—get some washers of tin or sheet iron made to fit the central rod of the hinge. As the cause of the sagging is, generally, the wearing down of the hinge, these washers will relieve the difficulty without marring the paint or the door. If of the old style hinges which are fastened together, remove the screws from the casing, take out the hinges, then wedge up the door from the bottom until in its original place; mark the positions of the hinges and remove sufficient wood to admit of the rise. Plug the old screw holes firmly, and putty up the spot left beneath the hinges, and color to conform to paint on wall.

Creaking Doors.—A little sewing machine or olive oil applied to a hinge will take the music out of it. If it is rusty from disuse, apply a little coal oil first.

Stopping Cracks in Doors.—When blinds and doors do not close snugly, but leave cracks through which drafts enter, the simplest remedy, recommended by Mr. Schuetse, Building Commissioner in Germany, is this : Place a piece of putty along the jambs, cover the edge of the blind or door with chalk, and shut it. The putty will then fill all spaces which would remain open and be pressed out where it is not needed, while the excess is removed with a knife. The chalk rubbed on the edges prevents the adhesion of the blind or door, which then can be opened without adhesion, and the putty is left in place, where it soon dries and leaves a perfectly fitting jamb.

Sliding Doors.—Sliding doors for wardrobes and closets would often prove more desirable ; they do not impede the light as hinged doors often do. Above all things, when arranging a house, attention should be given to the accommodation of bedsteads in chambers, and at the same time secure a fitting place for the toilet. Too frequently a bedstead has no fitting place in a room, but has to be set across a window. Light and ventilation are great objects in sleeping rooms, for on these depend the health of the occupant

PLASTER AND PLASTERING.

Material for Plaster.—The two important things in making a plastered wall is to have a good lath foundation, and good mortar to spread upon it. Skilled labor without good material will prove ineffectual.

Good lime and sand are most important requisites. If the sand is dirty, it should be washed before adding the lime.

How to Mix Mortar.—For the first, or what is termed “scratch coat,” six barrels of sand will require one barrel of unslaked white lime, and one bushel, or seven pounds, of hair.

For the second, or brown coat, eight barrels of sand will require one barrel of unslaked lime and seven pounds of hair,

For both the scratch coat and brown coat, the hair of the goat is better than that of the cow, on account of its greater length, but cow hair answers a very good purpose.

For the last, or hard finish coat, slake best white lime and strain through a fine sieve, when about the thickness of ground paint as it is canned. Put about seventy-five pounds of this on a tight, clean platform, and work out the center so as to form a cup or rim ; then into the center put about three or four quarts of water, and about ten pounds of plaster of Paris ; then mix and work thoroughly. Besides working, it should be well troweled.

The slaking of lime is so simple a process, and so well understood, that it need not be explained here.

Quantities of Material for Plastering.—It is safe to estimate that one thousand laths will cover sixty yards of wall, and one thousand laths will require seven pounds of nails. To cover sixty yards of wall with scratch, or first coat of mortar, it will require one barrel of lime, six barrels of sand, and seven pounds of hair.

For the brown coat six barrels of sand, six-eighths of a barrel of lime, and seven pounds of hair. The second coat will take about the same in quantity as the first, as it must be laid thicker to even up the wall, and make a good foundation for the lime coat.

In estimating for the finishing coat, allow nine barrels of unslaked lime for one thousand square yards of lathed surface, and four barrels of plaster of Paris. Remember that one barrel of unslaked lime makes three barrels of white mortar.

Working Mortar.—For the two first coats mortar needs a good deal of working—much more than it generally gets. The old-fashioned way of rubbing with a hoe is a good one, and should be put through several times. Merely stirring the mortar like so much mush does not answer the purpose at all; it must be regularly worked so that the particles of lime and sand may be brought into intimate contact.

In Europe the best builders, it is said, work the lime carefully after it has been slaked till it assumes a pasty condition, when it is mixed with the sand, and then worked thoroughly until perfectly incorporated.

I have found it a good plan to put the hair, well separated, into the lime box and run it out into the sand-bed with the wash.

Keeping Mortar.—It is sometimes necessary to keep mortar for some time, or to be at the expense of making up a new batch. In such a case the mixture should be covered, if in summer, and kept moist; or put in a cellar, if in winter, and kept moist there also. It is also essential to give the mass an occasional working over. When mortar has once set solid, its tenacity and vitality cannot be again returned; or if it has once frozen, it should be abandoned as worthless. It does not injure mortar to stand if kept plastic. Simply putting it in a damp cellar will not keep it from setting. The only safe way is to wet it thoroughly, and give it a working.

Plastering on Old Laths.—It is not an easy matter to make plaster stick to old laths from which a dried coat has been removed. The reason is that the dried particles or dust still adhering to the wood fibre, prevent adhesion of the new coat. The old laths should be pounded lightly to jar off the sand, and then brushed thoroughly with a stiff brush or broom. After this dampen the laths, and apply the new coat. If the upper side of the laths can be reached, sweep that also.

Plastering in Cold Weather.—Fires should be kept up in a house while the plastering is going on and until the first is dry, providing the weather

is cold enough to freeze the mortar. If the mortar is put on in freezing weather and no fire used, it will be found that the clinches on the inside will freeze and thaw with the change of temperature, and thus the clinches break with bad results.

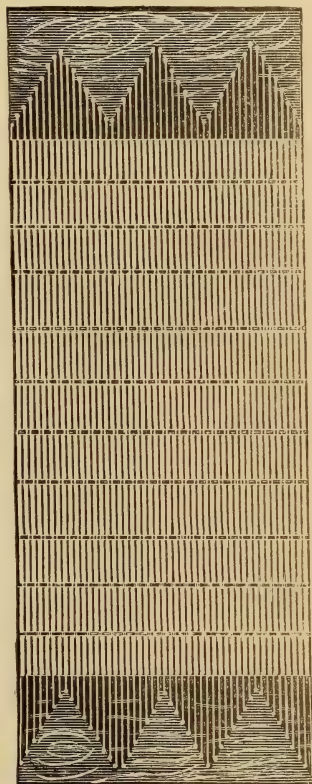
Cracking of Plaster.—When the finishing coat cracks upon the wall, it may be known that too much lime has been used for the amount of plaster of Paris. Pure plaster of Paris will never crack; but it sets too thick for the convenience of the operator, so lime is mixed with it. If you try to plaster with lime alone, it will crack all over in drying, and perhaps come off in patches.

How to Make a Sand Sieve.—Get No. 9 wire, cut into even lengths of four or five feet, and bend about three-quarters of an inch of each end at right angles. Cut and bend enough wires to spread over a surface of twenty-four or thirty inches, leaving space between the wires about one-fourth of an inch.

Take two pieces of plank as long as the sieve is to be wide and lay them upon the floor, and after making gimlet or awl holes, drive in the wires as represented in the engraving. If the wires are driven across the plank in line they are liable to become loose, so it is better to vary them at the ends.

After the wires are all driven, put in cross stays, or supports, once in about seven inches. These are quickly made by taking fine, well annealed wire, and braiding over and under across twice or more, and staying the ends.

Next box the sieve, by nailing on side and end boards five inches wide. The boards are nailed to the end planks flush on bottom side, and forming a box on top side. The top, or box side, should be that on which the wires are fastened to the end planks. To sift sand, set the sieve on end, and brace with a board at an angle of about forty degrees, and throw the sand against the wire with a shovel.



SAND SIEVE.

Plastering Floors.—In coating a cellar bottom, or other floor, with mortar, the gravel foundation should be tramped down very hard. For the plaster take clean, coarse, and sharp gravel two parts, and one part best water lime cement, and mix to a consistency that will admit of spreading conveniently. Apply to thickness from half an inch to an inch or more, and allow it to dry slowly.

MANAGEMENT OF WINDOWS.

Protecting Windows with Paint.—Give window sash at least two coats of paint before the glass is set and the glazing done. This will insure a strong hold of the putty, and prevent the glass getting loose. Further than this, the putty will not peel off from influence of the weather. "Primed sashes," as sold, are only brushed over with Spanish whiting and oil; they should be double coated with good, white lead paint.

To Remove Paint from Glass.—When the brush touches the glass, the spot may be readily removed, while fresh, with a rag wet with turpentine. After the paint has become dry, it may be removed by use of a hot solution of sal-soda, applied with a soft flannel. Another way to remove dry paint from the pane is to make a small swab, having a handle some eight inches long, dip it in a little dilute oxalic acid, and rub off the paint with the swab.

To Hold Windows Up.—The old English method is performed by means of cork, in the simplest manner, and with scarcely any expense. Bore three or four holes in the sides of the sash, into which insert common bottle-cork, projecting about the sixteenth of an inch. These will press against the window frames along the usual groove, and by their elasticity support the sash at any height which may be required.

To Stop Windows Rattling.—When a window rattles it should be examined to find the exact spot where the trouble is. The jamb casing in some cases may be moved a little, and remedy the whole affair. Sometimes, however, this cannot be done without disfiguring the face casing by showing a streak where the paint is separated.

In that event make some small side buttons, and screw one on each side of the jamb at the centers of the upper and lower sashes. These buttons should be so adjusted that they may be turned with a good deal of pressure against the sash. These will crowd the stiles of the sash outward against the stop of the window frame, and the sash will not only be held so firmly that it cannot rattle, but the crack which admitted dust and a current of cold air will be closed so tightly that no window strips will be required in winter.

To Make Windows Look Long.—Many persons, living in old-fashioned houses, would like to have their windows lengthened in appearance on the inside. This can be done by means of the curtains. Make them with a standing ruffle, or puffed at the top, and fasten on to a strip of board as long as the window is wide. Nail this to the wall as high up as you want it, using a nail in each end. The shades can be attached to the strip, under the curtains.

To Remove Spots from Windows.—For washing windows put a few drops of ammonia on a piece of paper, and it will readily take off every spot or finger mark on the glass.

PAPERING WALLS.

Cheap Wall Paper.—It is an easy matter to spread paste upon paper and the paper upon the wall; easy to do it right, but easier to do it wrong. Cheap wall paper, with highly colored designs, is the most difficult to put on neatly, for the paste moistens the colors, and the paper is disfigured when smoothing down, giving it a very bad appearance.

Trimming Wall Paper.—Trim one edge of the paper, cut a dozen or more strips a trifle longer than the distance between the top of the wall and mop or base board, so the figures will match. After a sufficient number have been cut, lay several of them in their regular order, figure side down, upon a board, bringing the first strip cut at the top of the pile. The board should be a trifle wider and longer than the paper, with the ends supported upon a couple of light stands or tables.

Pasting Wall Paper.—Apply the paste with a brush—a small, half-worn whitewash brush is best—beginning at the lower end, and paste the top of the strip last. This will prevent the paper becoming tender by the moisture soaking through at the upper corners, where it is necessary to take hold to carry it. After pasting, take hold of the two lower corners, and double the strip. Then double the upper half back again, letting the lower end project an inch or two below where the first fold was made; now take hold of the two upper corners, and carry the strip to the wall; have something to stand upon which will elevate you so you can reach the top of the wall.

How to Hang Wall Paper.—Commence papering in one corner of the room, and go around to the right or left, according to which edge of the paper is trimmed.

After staying the upper end to the wall, step down, take hold of the two lower corners, and pull out the folds and smooth it on the wall. After the first strip is hung, match the other carefully by it, and smooth out the paper from the top downward. If cheap paper is used, do not wipe it with a cloth, but brush it with a new broom; this will prevent blending of colors.

Each strip of paper, as it is hung, will be found to project over the mop-board. Run your finger over the paper upon the edge of the board, and then with a pair of sharp shears cut by the mark, and fit the paper nicely to its place. When fitting around a door or window casing, never try to cut by measure, but use the scribe rule; take the strip before pasting, match the figure accurately with that already on, then run the ball of the thumb over the paper around the casing, and cut by the mark.

After a few strips have been put on, it is advisable to use a plumb, and see if the paper is perpendicular. If not, bring it plumb by lapping at the top or bottom gradually, as the case may require, to bring it as it should be.

Patterns in Wall Paper.—Papers of a large pattern greatly reduce the apparent size of the room, and those of a large and flowing pattern increase the apparent height. A paper in which perpendicular lines predominate, although the pattern be large, does not so much affect the apparent height. To cover a small room with paper of a large pattern is a great mistake, and a still worse mistake is to paper the ceiling or wall overhead. The best effect is produced by using papers in which the pattern and colors are quiet and harmonious, and do not strike the eye. The walls of a room are like the background of a picture, and should be treated so as to relieve and set off the object in front of them, and to give repose to the eye.

A paper presenting sudden contrasts in color and strongly marked lines in the pattern, forms the worst possible background for pictures, and the most unfavorable accompaniment to furniture, draperies, and objects of taste; the spotty effect of such a papering interferes with all minor objects in the apartment, and gives an unpleasant and bewildering effect.

Preparing Walls for Paper.—All old, highly-colored paper should be removed from the wall before new is put on, for it will stain through common paper, and make a very bad appearance. This can be done by thoroughly wetting the paper with hot water, and using a steel scraper.

Where you desire to paper a wall that has been heavily coated with white-wash, wash the wall with a solution of vinegar in water, or with hot brine, after sweeping the walls thoroughly with a stiff broom. Put paste both on the wall and the paper.

To Make Wall Paper Paste.—For twelve to fifteen rolls of paper about a gallon of paste will be required. It is all the better for being made up several hours before it is required for use. Make a batter of a little more than a pint of wheat flour first, almost as thick as dough, then thin it out, and gradually stir it into a gallon of hot water. In this way the formation of lumps in the paste will be avoided. Keep the kettle over the fire, and stir continually while cooking until the milky appearance changes to a cream color, and it becomes thick and glutinous. Paste should not be warm when used, for it penetrates the paper much more rapidly, neither should it be used thin upon a poor quality of paper. Use thick paste upon rough walls. If too thick, thin with cold water and stir well.

To Keep Paste Sweet.—Sometimes where a heavy coat of paste has been used, and especially when applied to a wall previously papered, decomposition will take place, and produce not only an unpleasant smell in the room, but an unhealthy atmosphere. This may be avoided by adding to the paste a small quantity of carbolic acid.

Cleaning Wall Paper.—Take a piece of wood of the shape of a scrubbing brush, nail a handle on the back, then upon the face nail a piece of dried sheepskin, with the wool upon it, or flax or tow will do, or cotton flannel of

several thicknesses will answer very well. Bring the ends of the material around, and fasten at the ends of the piece of wood, to avoid nail heads on the wiping surface. Dip this brush into dry whiting, and rub the paper lightly with the brush on the upper parts of the room first, protecting the carpet with matting or newspapers, as the whiting dust is hard to sweep off the carpet. It is best, where convenient, to take the carpet up. The whiting that remains on the wall is easily brushed off with a soft cloth attached to a stick. It is very effectual if the room is not damp and the whiting is dry.

Another Method.—The best method to adopt, says the *Manufacturer and Builder*, for cleaning paper upon the wall, is to cut into four or six parts a moderately-sized loaf of bread that is two days old—it must be neither newer nor staler. With one of these pieces, after having blown off all the dust from the paper to be cleaned, with a good pair of bellows, begin at the top of the room, holding with the crust in the hand and wiping lightly downwards with the crumb, and half a yard at each stroke, till the upper part of the hangings is completely cleaned all around. Then go around again, with a light sweeping stroke downward, and always commencing each successive course a little higher than the upper stroke had extended, till the bottom is finished. This operation, if carefully performed, will frequently make very old paper look almost equal to new.

Great caution must be used not by any means to rub the paper hard, or to attempt cleaning it in a lateral or horizontal way. The dirty part of the bread, too, must each time be cut away, and the pieces renewed as soon as it becomes necessary.

To Stick Paper to Tin.—Sometimes it is necessary to paper over sheets of tin. In that event add sugar or molasses in large proportion to the paste. This will be found generally effectual. A manufacturer of sticking plaster, whose tin rolls were apt to be greasy, says that rubbing the tin with old carpet was a perfect remedy, and he had no trouble to fasten his labels since he discovered the fact.

PICKET FENCES FOR DOOR-YARDS, ETC.

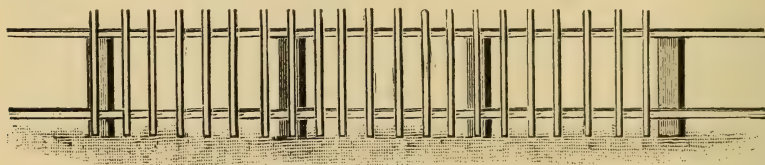
Cheap Picket Fences.—There is no end to styles for fence building, either of board, wire or picket; wire, however, if made ornamental, is somewhat expensive, and a board fence usually costs more than one made of pickets. The latter, for cheapness and utility, is the best, and ordinarily presents as neat and tasty an appearance as any other.

To build one of these fences in the most economical manner, and yet the most durable, set the posts well in the ground, six feet apart on a straight line,

then saw off the tops and spike down to them scantling stringers two inches thick and four inches wide, allowing the edge of the scantling to project over the front surface about half an inch.

Ten or twelve inches from the ground let in another stringer, flatwise, cutting the notch into the post but one and one half inch deep, so that this stringer will also project half an inch. Now you are ready for the pickets; use no bottom or base board, but allow the sticks to reach down within a few inches of the ground. Nail on with a space of three inches between them; saw off the tops by line and corner them up.

If the ground is only made uneven by small knolls and hollows, the top of the fence should be made straight, but if there is a gradual swell to the surface, the fence should be made to conform to it. If the bottom ends of the pickets are to be set by a drawn line, then the sticks should all be cut to one length before nailing on.



PLAIN AND CHEAP PICKET FENCE.

As to the size of all the pickets, we would not have them less than an inch and one eighth square; they should be of pine, no other wood that we can get is better; oak and ash will do, but it is harder work to dress them, and difficult to nail them on with heavy nails, especially when seasoned, without splitting them.

The object in having the projection of the stringers beyond the face of the posts is, that there may be no place where moisture will be retained, and hence avert decay. We do away with the bottom board to save expense, and do not injure the appearance of the fence by so doing.

As to height, that is entirely a matter of taste; for a door-yard we like to see them low, at most not over three and a half feet high. The posts should be cut to a height after setting some eight inches less than that intended for the height of the fence.

Paint snow white: no color gives such a neat and tasty appearance. Use heavy nails to put on the pickets, and no battens or cleats will be required.

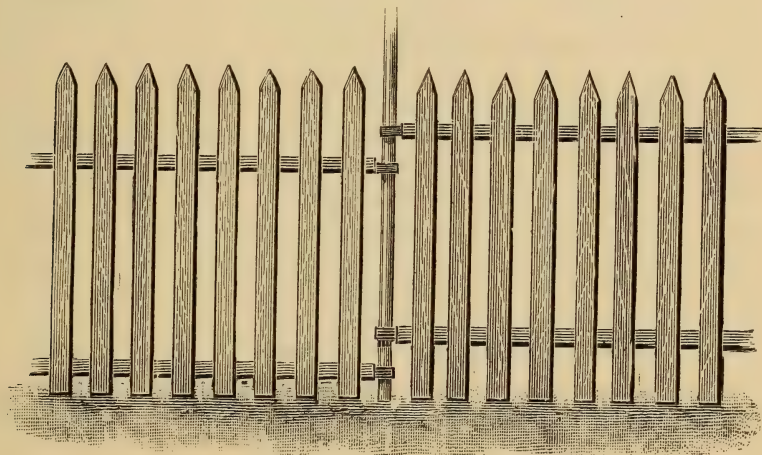
Portable Picket Fences.—A portable picket fence may be easily made in flat sections to be used for changing location of kitchen garden or poultry yard. The pickets may be made of any desired length, about three inches wide and three fourths of an inch thick; half inch will answer very well, and have the advantage of being light. The rails should be about three inches

square and ten feet long. At each end of the rails, after being sawed to exactly the same length, put on a piece of wide hoop iron, bent like the letter U. Punch holes and fasten on with stubbed inch screws. A loop will thus be formed large enough to admit a stake two and a half inches square, as represented in wood cut.



RAIL FOR PORTABLE FENCE.

Prepare two for each section of the fence to be made. After all the rails are prepared, lay two down upon the floor, or level ground, and nail on the pickets three inches apart. The rails should be separated according to the length of the pickets, and every other length should be varied so that when the sections are put together, the rails, or rather the loops at the ends of them, will not come together, but one above the other. When set up, the fence rests upon the bottoms of the pickets, and a stake, round or chamfered, is passed down through the loops or staples, and driven into the ground, as shown in the illustration.



PORTABLE PICKET FENCE FOR POULTRY YARDS.

The fence will need bracing, and this should be done from the outside. Take a piece of 3 x 3 scantling, of sufficient length to make a brace at an angle of forty-five degrees, and put upon this, at each end, U shaped bands, the same as the rails, only using one screw upon each side, so the bands will turn upon the stick. Slip one of the staples down upon the stake until it reaches the rail, and through the other end drive a stake into the ground, bracing away from the fence. The ends of the brace should be cut beveling, so as to conform to the two stakes, and to rest square upon the ground,

BUILDING BOARD FENCES.

Important Features.—There are two leading considerations when building a board fence, and these are appearance and utility. The most important feature concerning the latter is the posts, and of the former, style and paint.

Durable Fence Posts.—As to my own experience in the preservation of timber, which has been somewhat extensive, I have always found the quality and condition of posts at the time of setting to have more to do with their durability than any appliances I could use.

Coal Tar and Charring.—Coal tar is a benefit, no doubt, when applied to seasoned wood, and charring, when done upon green timber, may be of a little advantage, but it will not help them to any considerable extent. The outside charcoal thus formed will not decay, but there is no strength in it, and it is only at the surface. Being porous, it allows the water to pass through it into the central uncharred wood, and cause its decay. There may be some benefit by the heat hardening the albumen, but soaking the lower ends of dry posts in a kettle of hot tar is far better.

Live Oak Posts.—I set several hundred posts at one time which stood for over twenty years without attention. They were of seasoned white oak, the timber having been cut while green, sawed immediately, and well put up under shelter, where a free circulation of air was received, and thoroughly seasoned before being set. At another time I set a number of white oak posts, sawed from dead, but sound timber, and seven years was the extreme limit of their endurance. They all rotted off at the surface of the ground. Hence, I believe that one of the principal causes of decay in timber is owing to the fermentation or decomposition of substance matter. When a stick of timber is so placed that the sap has no chance to escape, and the albumen cannot harden, fermentation and rot very soon follow.

The reason that timber lasts well under water, is because the albumen is soaked out, and the same principle holds true with wood buried far enough under the surface to be kept damp. You will always see a post first decay near the surface, where there is not water enough to soak out the fermentable matter, or air enough circulated to dry up the grains of wood.

Coating Green Posts.—The application of any substance to the surface of a green stick only confines the ingredients that become destructive. Any one knows that oil paints and other water-proof materials preserve seasoned wood from decay, but in using them upon posts we should not coat the bottom end of the stick, but leave the pores open at this place for water to escape into the earth that is contracted above.

The durability of posts depends a great deal upon the quality of timber. A porous or spalty tree should not be chosen for posts; such will last but about one half the time of good fine grained wood.

Timber for Posts.—White cedar is considered one of the very best of timbers for fence posts so far as durability is concerned, and, in consideration of this, they are, perhaps, as cheap as of any timber where they can be readily obtained. If situated where good white oak posts can be obtained at a reasonable figure, say ten to fifteen dollars per hundred feet, I should use them, for they will last a quarter of a century if of good quality and properly managed.

Posts Top Downward.—As to setting posts top downward to make them last, there has been a good deal of discussion. I have obtained the written opinion of two well experienced men, whose testimony is here given.

One says: "Many years ago, by way of test, I set two gate posts, one top and the other butt downward. The latter was taken from the lower, and what might be supposed the best end of the log, and both were entirely sound. I had, some years since, occasion to remove these posts; the latter was entirely rotted off, and the former would have lasted some six, eight or more years longer. I tried two pieces of post fence with similar results. It is such experiments as these that have got into my head, and most men's heads, the notion that posts set top downward will last longest. Such practical tests are of more importance in deciding such questions than all the philosophical reasons that could be produced. Although I have heard of no philosophical reasons why a post set top downward lasts longer, yet I have one of my own. It is moisture, for instance, that rots timber. Keep it dry and it is exempt from decay. There are many kinds of shrubs, etc., that will propagate from the slip; for instance, the currant, grape and willow. These, although separated from any connection with the root, continue to elevate the moisture from the earth, so as to cause their growth. Of course, the vessels of post timber, if placed in the ground according to the arrangements of nature, will elevate the moisture and keep the timber damp; but if that order is reversed, it remains comparatively dry; hence, the principal reason, no doubt, why a post lasts longer top downward."

Another man, of large experience, says: "Some twenty-three or four years since, I built a fence, inclosing house and door yard, a rail and banister fence. The posts were sawed from good sized, first growth, red chestnut logs. To saw them tapering, one half of them must be sawed to set in the ground, top down, and the other half bottom down. The posts were set promiscuously, and to this day there has been no distinguishable difference in their lasting quality, unless it be where some of them had more sap on than others, and these gave out first, without regard to which end was set downward."

In my own case, the posts being sawed tapering, one half were tops and one half butts down, and no difference was seen as to utility, excepting that those cut from near the outer surface or top of the tree yielded quicker than those cut from the heart of the log.

Field Board Fences.—In the report of the Wisconsin Agricultural Society, W. D. Williams gives his manner of making board fences, which is

very reliable authority : He built two lines of fence, making a lane, into which all his fields opened, the lane leading to the barn. On one side of the lane the fence was built in the usual manner, level with the surrounding ground ; on the other side, the bottom board was raised fifteen inches above the general level of the ground along the line, and when the fence was completed, two furrows were thrown toward the fence on either side, the first against the fence, and the second furrow thrown on top of the first one, raising the ground or bank nearly to the bottom board of the fence. The bank was then smoothed off, and plenty of grass seed strewn over it.

This line of fence was never disturbed by any animal, nor a board nailed on, or a post righted while he occupied the farm (nine years). Neither did an animal attempt to get over it, to his knowledge, and when he left the farm the fence was nearly as true in line as the day it was built.

The other line was a source of constant anxiety and watchfulness. Fully one fifth of the original fence boards had been replaced by new ones, and not a few of those remaining bore the marks of the frequent assaults of cattle and horses, either in attempts to get over or through the fence, or in rubbing against it ; and the posts had to be frequently righted, while the wind broke many nails. Now it presents a dilapidated, insecure barrier to cattle, while the other line is apparently good. The material was the same in both lines.

The sharply inclined bank gave no convenient standing place for cattle to rub against the fence, and animals in approaching found their forefeet below the level, thus pitching the head down, and making the fence insurmountably high. And for the same reason no cattle or horses ever attempted to crowd or reach through.

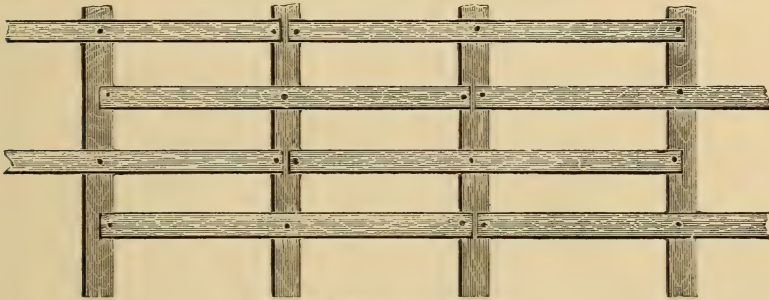
The sharply inclined bank gave also a dry, firm bed for the posts, holding them at all times securely in line, and firm against the force of the wind, and, he thinks, added to the life of the fence at least fifteen per cent. From his experience he feels warranted in affirming that this method will save not less than six per cent. annual cost over the usual mode of building.

To Prevent a Fence Sagging.—Some little trouble attends the effort to prevent a fence sagging, but experience has shown that it may be done by using underground cross blocks. The blocks should be of oak, split out four inches thick and six or eight inches wide. A gain is cut in the center of the side of each block the width of the post, a few inches from the butt, or lower end, and into this gain the post is driven tightly, so that it will project ten or twelve inches below.

The block, or bar, is put on crosswise of the fence line, which holds the post in an upright position. Sawed posts are made tapering, or wedging, so that the cross-bar may be driven down upon them firmly ; but in case the gain is by mistake cut too large, wedge them up tightly, which will answer a good purpose. When setting the posts, bore the holes the proper depth ; then with a

spade cut down the sides to the right size and depth for the cross-bar ; then with an auger clear the cut below, and put in the post, and stamp the earth firmly.

How to Put on Boards.—The durability of a board fence depends much upon the manner in which the boards are attached to the posts. The boards should be so placed that they will break joints, not allowing a tier of boards to end upon the same posts, for the fence will soon sag in and out. This can be obviated by merely sawing one of the narrow boards in two in the



BREAKING JOINTS ON BOARD FENCE.

middle. Begin nailing on the boards at one end of the row of posts ; nail the bottom board at full length, then one half of the narrow board ; again a full length board, then the other half and a full length top board ; the balance of the fence can be built of full length boards, and the joints broken in such a manner as to make the fence a strong and durable one. The cut illustrates the suggestion.

Amount of Lumber Required.—When it is desired to know the number of feet of lumber it will require to build a certain length of fence, all that is necessary is to add the widths of the several boards to be used together ; *i. e.*, if the bottom board is one foot wide, and the four above it six inches each, there would be thirty-six inches width ; now divide that sum by twelve, which would give three, then multiply sixteen and a half feet, which is one rod, by the three, and you have forty-nine and a half feet to the rod ; multiply that by the number of rods, and you have the whole amount of lumber required without battens.

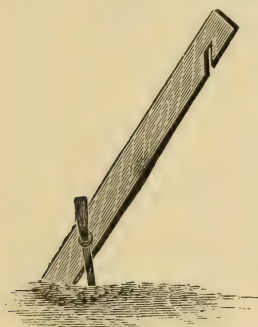
Cheap Portable Board Fence.—There are very many styles of portable board fences which are difficult to make and expensive. As a movable structure is not generally used where beauty is a consideration, some of the cheaper forms are just as good as the expensive and complicated. Take inch hard wood board twelve feet long, and upon these nail three cleats, made of boards six inches wide and four feet long. Nail one cleat in center, and the other two six or eight inches from the ends of the boards, as shown in engraving. Use wrought nails, and clinch them,

When these sections are set up, the ends of the boards lap by each other. To hold the fence up, put cross stakes between the top and second boards, and



SECTION OF PORTABLE FENCE.

drive the stakes into the ground. The stakes must be put through where the boards lap. The widest space on the fence should be between the top and next to the top boards, so that the stakes will not be spread too much at the base, or the boards may be notched or beveled where the long stakes pass.



PORTABLE FENCE SUPPORT.

For sheep pens it is best to have all the bracing from the outside. This may be done by abandoning the stakes, and using a single brace and two short stakes driven each side of the lap of the lower board straight down. For the brace take a piece of fence board of sufficient length, according to height of fence, notch one end so as to slip down upon the lap of the top boards, and put a staple in near the lower end, through which pass a stake bracing out from the fence, as represented in illustration.

After everything is prepared, the fence may be quickly put up and taken down again, as the stakes need not be long.

Repairing Old Board Fences.—Where the nail holes under the batten cleats have rotted to large size, and the boards have become loose, put on new facing cleats, and use long nails, driving them up firmly, and the fence will be made to stand several years more. Where now and then a post has rotted off at the surface of the ground, and new ones are not at hand for replacing, drive a four by four sharpened scantling with a sledge hammer down close beside the post, until only a foot or so projects above the surface. Three inches above the ground saw in two inches, split away half or more of the scantling, and fasten to the post with large nails.

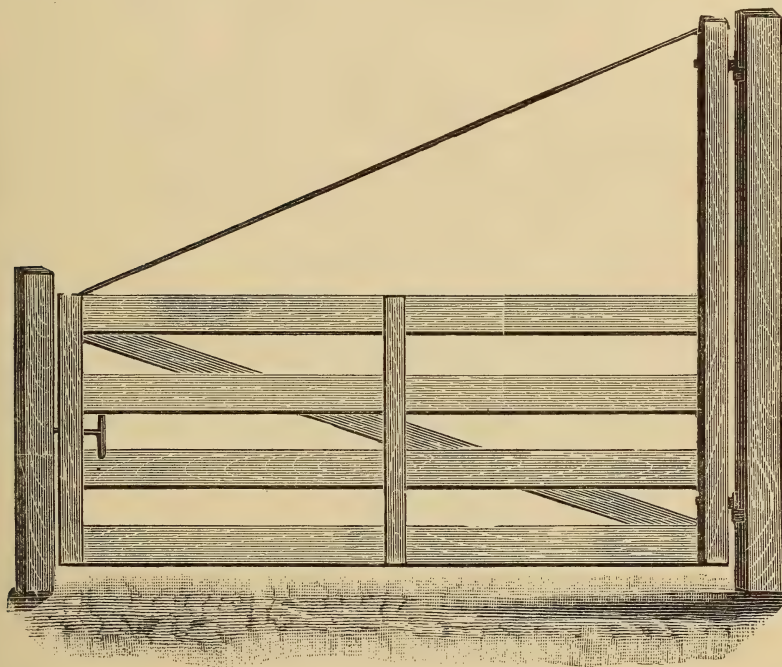
Fireproof Board Fence.—Make a wash of one part fine sand, and one part wood ashes, well sifted, and three parts lime ground up with oil, and mix them well together. Apply this to the fence with a brush—the first coat thin, the second thick. This adheres to the boards or planks so strongly, it is said, as to resist fire, and is, besides, impenetrable by water.

Board Fence in Swamps.—Where board fences are to be made upon

loamy or swampy land, the post had better be set while the ground is very wet, and no boring for post holes be done. Sharpen the lower ends of the post, and sink them by what is called the "chugging" process. Thrust them down as far as possible, work sidewise, lift and force down again until the desired depth is reached, then pack as well as can be at the surface. They will be tight when dry weather comes.

CONSTRUCTION OF GATES.

Gate that will not Sag.—A very good gate may be made as follows: Take two pieces of three by four scantling, one piece four or five feet long, according to the height of the fence, and the other twice the length of the first; then let the boards into the uprights their thickness, and before nailing them



ROAD GATE THAT WILL NOT SAG.

dovetail a brace into the notches already cut, running from the top of the latch end to the bottom of the hinge end. This brace can be made of a three-fourth strip of board, and should be about four inches wide.

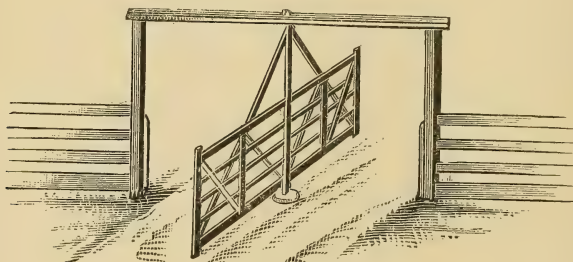
After putting the gate together put on battens, and nail them firmly to the

scantling ; also nail battens in the center, and for these wrought nails should be used.

To give support, a three eighth rod of iron should be fastened at the top of the hinge scantling, and extend down to and pass through the top of the latch end, with a nut upon the end so that the rod may be drawn tight. After tightening, cut the end of the rod off even with the nut. A good idea may be gained by the illustration.

The rod support may be used upon a picket gate, as well as upon one of boards.

Another Method.—Another way, and constructed with less expense, is to dovetail the brace from the lower end of the front to the top of the hinge scantling, nailing firmly where the brace crosses the boards with wrought nails. This dispenses with the use of the rod, but does not look as well for a road gate.



DOUBLE OR HINGELESS GATE.

Set the post upon which the gate is to hang firmly in the ground, and let it extend a foot further above the earth than the hinge scantling is long. Use solid hinges, and put them on about fifteen inches from the ends of the long gate bar.

Gates made after the foregoing directions are not new or uncommon, but after trying several different plans for constructing, I have found none more satisfactory. Where such gates can be hung to the corner of a barn, or other out-building, they are a fixture for years.

Painting Gate Joints.—By putting a good coat of white lead paint into the notches in the scantling before putting in the boards, and then coating the caps before nailing them on, the durability is increased.

Hingeless Gate.—A hingeless gate may be made something after the plan of a swing bridge. The only objections to it are the action of double latches, and the space occupied, which must be double wagon width. A bed piece is set in the ground in the center, upon which the end of the scantling rests which supports the gate. A piece of king bolt iron is in each end of the scantling, which fits into holes in bed piece and cross frame. A good idea of the gate may be obtained from the illustration.

A Cheap Road Gate.—Take five pieces of inch boards, each ten feet long, one eight inches wide for the bottom strip, and each of the others four inches wide. Then take one piece four inches wide for one end upright, and one piece eight inches wide for the end piece where the hinges are to be. These strips are four feet long, that being high enough for any gate for ordinary purposes.

Now lay down your end pieces, then place the eight inch wide and ten feet long strip for the bottom, nail it at each end to the upright with wrought nails; now take three of the four inch wide strips and lay them on parallel with the bottom one, dividing the spaces so as to leave four inches between the lower two boards, and six inches each space between the upper ones; nail as before.

Now turn the gate over, and take the remaining strip, lay it at an angle from the bottom, at the hinge end, to the top at the latch end; cut it so that it will fit in and lie close to the long strips; nail it. Now hang with strong hinges, and you have a gate that is light and will not sag very much, and just as good a protection against cattle as one made by the joiner, and costing from three to five dollars.

Any person can put together and hang the above named gate in two hours.

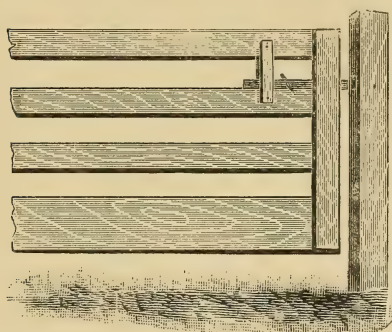
Another Method.—A gentleman gives his experience in gate making, which is somewhat similar to the foregoing: Take six pieces of stuff ten feet long, four inches wide, and one inch thick; lay these down on a level piece on the ground, leaving your first bottom space two and three quarter inches wide, the next three inches, the next three and a half inches, the next five and a half inches, and the next, or top space, nine and a half inches wide; then take the same kind of material and nail across the ends with annealed nails; then nail on a cross brace from the upper to lower corner, also with annealed nails, so that it will fit neatly inside of your end pieces.

Now turn your gate over, and nail similar upright pieces across the ends, even with the ones on the opposite side, and one upright piece midway between the ends. This latter is far preferable to putting on a diagonal brace on that side. In such a gate there is no mortising, and, for the weight of it, it is far stronger than any mortised gate that can be made.

To Hang a Gate.—After the halves of the hinges belonging to the gate are put into the posts, set the gate in place and support it just as you wish it when hung. Now mark the places for the hinges on the gate rail, and bore the holes. The upper hinge have long enough, so that the nut may be loosened to lower the front, or screwed up to raise it at any time when the latch does not work well. Put a bolt above and below the spot where the hinge goes through the gate scantling, to prevent the hinge splitting the piece.

Cheap Gate Fastener.—After trying all sorts of simple and complicated gate fasteners, I have never found one so satisfactory as the simple board slide, made as represented in the drawing.

A cleat is nailed each side of the front, or latch end of the gate, and two short ones a few inches back each side, then a little strip of board slides between these, resting upon the fence board. A hole is bored through the slide



CHEAP SAFETY LATCH.

and a short pin put in. A long slot is mortised in the post to receive the slide latch. There are several advantages in this arrangement; it is cheap and simple, and if the gate sags, or the post is moved by the frost, it will not interfere with the fastening. Again, if any animal lifts the gate, the latch goes up with the gate in the slot, but the gate is not unfastened,

If the gate opens but one way, a jamb casing may be nailed on the post to stop the gate. The cleats on the gate should be just far enough from the facing board to give proper play to the slide, so the pin will strike the cleats when slipped back far enough to free the post. The pin in the latch slide should be only long enough to get hold of it handily, and if any animal should learn to slide it, the trouble may be readily remedied by boring a gimlet hole through the side, where the gate is fastened, just in front of the cleat, and slipping a nail therein. This nail, or a piece of large wire, may be attached to a leather string, which can be fastened to the board above to prevent losing it. The gate can be opened and closed quickly, and one can depend upon its staying in place when shut. Where the gate is made with scantling end, it will be necessary to cut out a piece for the slide latch.

Permanent Gate Posts.—There are usually two important things neglected when posts are set. First, they are not put in deep enough, and second, they are too small. White oak is the best material, and if the posts are worked from a tree two feet in diameter all the better, leaving the part that goes into the earth full size—removing the bark, however—and working the smaller part from the heart of the stick. Set so as to have the shoulder come a little above the surface of the ground, to prevent rotting at that point.

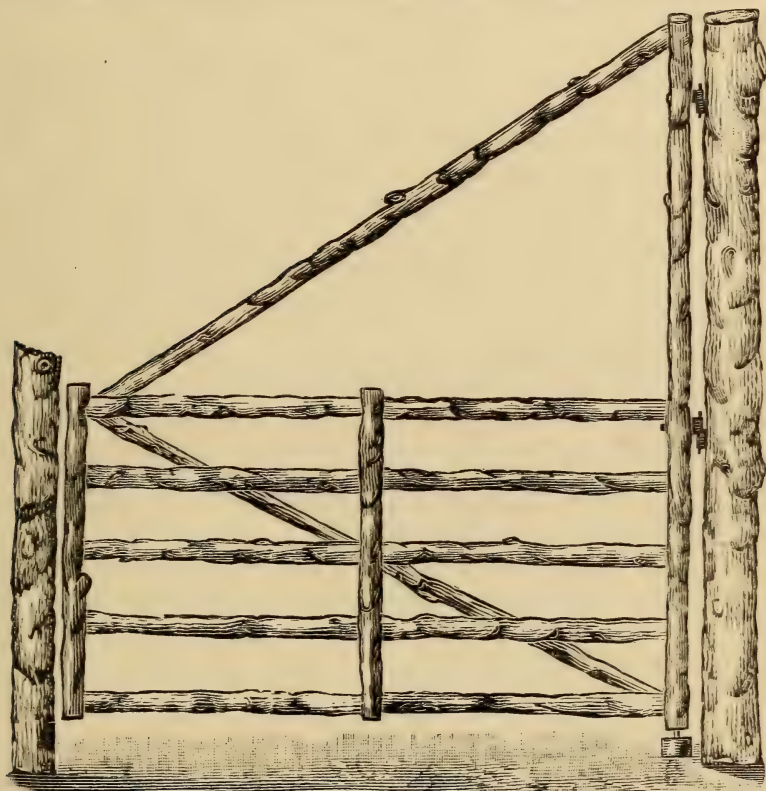
In some sections this method of post making will be a waste of timber too extravagant, and some more economical mode will have to be adopted; but where timber is plentiful there is no way more effectual, for the post will last for a great number of years, and always keep an erect position.

Limb Brace for Gate Posts.—If you cut the post on which to hang the gate, with a large, strong limb, projecting as near as possible at right angles with it, from the bottom or near it, and let the limb be three feet long, and set the post with the limb the opposite side of the gate, to balance it, and

pack well under the limb, and then put a good, flat stone or piece of timber on the end of it; fill up the hole—the gate post will never sag.

Posts of this kind may be obtained from the large limbs of oak and other trees, when they are cut for rails or other purposes.

Underground Brace.—Set the post three or more feet in the ground, tamp well at the bottom, on the side opposite the gate; then dig a trench six inches deep from one post to the other; in this put a large scantling, or a pole



LARGE AND CHEAP RUSTIC GATE.

of some lasting timber fitted in between the posts. Such a post will stand erect, till it rots off.

A Rustic Gate.—A large rustic gate can be made for certain localities that will have a very pleasing appearance. To do this, use round poles in place of scantling, and smaller ones in place of the boards, putting the gate together by boring inch and a half holes in the end pieces. The poles representing the boards should be tenoned with square shoulders, and level spots made on the

end pieces for the shoulders to rest against. In making these level spots, have them only large enough for the shoulders, so that bark will come to bark. The poles may be peeled if one desires, and painted when they become dry.

Rustic Gate Hinges.—Just inside the hinge post set into the ground a piece of log six or eight inches through, and two feet long, having a smoothly sawed end come three or four inches above the ground. Before setting this rest, bore a two inch hole in the center, about three inches deep, and tenon the gate end piece to fit loosely, with shoulder a little rounded. Make a tenon at top smaller, to work in a piece driven into the gate post at the right point. If the gate does not appear to be firm enough, put a brace from top of latch end to top of hinge end, and fasten by bolting at each junction. This brace should be a pole, the same as other parts of the gate.

CONSTRUCTION OF CELLARS.

Underground Cellars.—One of the most important rooms in any residence is the cellar. It is singular that so many houses are built without well constructed underground apartments, and more singular that when cellars are built, so little attention is given to making them frost proof and dry.

This neglect is not owing half so much to the amount of expense it would incur as to the lack of thoughtfulness, and a real appreciation of the value of a place for the perfect preservation of fruits and vegetables.

Thousands of people are required annually to bank up their houses for winter protection, and to remove the unsightly mass of dirt or sawdust when spring appears, thus making in a few years the expenditure of more time and labor than a secure wall would have cost.

So long as a wall is to be built, the calculations should always be to make it frost proof, for the additional expense is not a matter of enough importance to require mention.

The loss from poorly constructed cellars does not all come from the consumed time in banking, but from the frost penetrating when unexpected, and before the extra precautionary measure has been taken, or from an extra degree of cold at midwinter.

No danger need be felt of making a wall too secure against frost, and yet there is danger of keeping a cellar too warm. A convenient place should be prepared for admitting fresh air at will, and for the escape of the gases which generate, else fruits will rot and vegetables wither up and become worthless.

In a dry cellar roots may be kept in a fresh condition by laying them upon the floor and covering with leaves, or something of the kind, slightly dampened.

Good Cellar Bottoms.—Cellars should have a good bottom. Frequently they are rendered wet by the water that percolates through the soil from the eaves. When this is the case, troughs should be placed on the building, and means taken to conduct the water so far away that it will do no injury. Sometimes, too, the drains are imperfect, and need looking after.

All cellars should have a hard bottom. One made of cement is not expensive. It keeps the rats from working under the wall, and making quite too free a use of the stores of fat things. Cement makes a good bottom, which may at any time be swept like any other floor.

Cellar Windows.—Generally a cellar should be darkened in the winter. The usual way is to bank up the windows with tan bark, dirt, or straw. The windows should be double, and to keep out light and frost, have shutters on the inside which can be removed at pleasure. In this way you can regulate the light and ventilation as you desire.

Bins and Shelves.—Bins and fruit shelves are usually made of pieces of boards, all sizes, and of such as can be used in no other way, put together with pins and propped up by pieces of timber from the wood yard, or broken bricks and stones. Such bins are a nuisance, and should never be found in the cellar of any one. A little good lumber and mechanical labor for a day or two would fix things up to your liking. The work will pay : first, in better preservation of the fruits and vegetables stored therein ; and, second, in the satisfaction of having it as it should be.

Cellar Drainage.—A residence should always be located where good drainage can be secured. When making the excavation, dig, for the wall, ten inches or a foot below the point where the cellar floor is to be ; then have the drain as low as the bottom of the wall. The wall should be well cemented. By such a plan the cellar can always be kept dry. If the wall only goes to the cellar bottom, in a wet time the water will soak down the outer surface of the wall and then pass under and dampen the cellar bottom. Tile drain is highly commended by some. It should go entirely around the foundation. To remedy a wet cellar already built, sink a channel nearly a foot deep entirely around, close to the wall, and lay a course of drain tiles in the bottom, which will cut off all water veins, and thus render the cellar quite dry, by conducting the water into the tiles before it can work through or under the wall.

Up-Ground Cellars.—On the construction of outdoor cellars, I cannot do better than to annex the modes of building furnished me by men who have tested cheap and yet most convenient structures, which perfectly withstand the effects of frost.

One writes : Dig a trench nine inches wide and a foot deep, lay a wall with lime mortar, six inches above the ground. For sills, take two joists, two by six ; set them on the wall edgewise, five inches apart ; use studding two by nine, nine feet in length. Match the bottom of studs on each edge, so that they will

fill the space between the sills, and be even with the out edge—spike to the sills. Spike on one foot from top of stud joist two by six.

For plate use same joist spiked on top of stud; lay a good matched floor on joist to the stud, ceil outside and inside from the bottom up to the floor or ceiling. Set a two inch partition round the inside, letting the bottom rest on flat stone, fastening the top to the joist overhead so as to leave a space of three inches for dead air. Put on a good roof; put in double sash windows for winter, one in each end, so as to have a good circulation of air. Protect with blinds.

Cement the bottom with water lime and gravel clear to the stone wall, four inches thick. After the cement is hardened, lath and plaster the sides with two good coats of mortar; then cement the bottom with another coat of water lime, and gravel one inch thick. Be sure and leave no cracks round the edges, and it will be rat proof. A small door is necessary in one end above the floor for putting in sawdust; fill all the spaces between the studding to the roof, covering the upper floor a foot thick. If it connects with a living room (which it should) a single door for entrance is all that is necessary.

Another Method.—An excavation is made the size desired for the cellar, two feet deep, and a wall one foot thick, of brick well cemented, laid around outside from the bottom up one foot above ground. Double sills of four by four scantling are used, one piece coming even with the surface of the outside wall and the other three inches back from the inside surface, thus leaving one inch space between the two pieces used for sills. No studding is used.

The sides are then boarded up and down with common lumber which has been brought to a thickness by running it through a planing machine. On the two sides, the boards used are but four feet long, but the ends are long enough to run up and form the gable. After the outside is all put on, strips of cloth are pasted over the cracks on both sides, and then battens nailed on over these.

After the inside has been boarded up, the cracks are covered on one side—as but one side can be reached—with cloth and cleats one inch thick and three inches wide. The rafters are of lumber one and one half by six inches. Double roof boarding is used, so as to break joints thoroughly, and common shingles put on. The under sides of the rafters are boarded over, cloths put on, and cleats, the same as inside of wall; then the whole interior is lathed upon the battens, and a heavy coat of plaster put on.

When the inside walls are finished, they are straight from top to bottom, as the sills are three inches back; the boarding, battens, lath and mortar, bring it out even with the inside surface of the brick wall. Nothing is put between the two walls, and therefore the cellar is dry and cool in summer, and perfectly secure against frost in winter.

Double doors are made, one to swing out and the other to swing in, and a small double sashed window in the gable end, which is sufficient for lighting the

room. Where the ground is low, it would be better not to dig into the earth, but have the cellar entirely above ground, unless thorough drainage can be given. In any case, the bottom should be gravelled and well cemented.

When the cellar is entirely above ground, it is not as secure against frost as when partly below, but with a little care during the coldest of weather all damage to fruits and vegetables may be averted, by setting in a kettle of live coals often enough to keep the air above a freezing point, or if preferred, a small stove may be used.

Cheap Cask Cellar.—For keeping vegetables no cheaper construction can be made than sinking a headless barrel into the ground half its depth, and banking the dirt from the excavation around the protruding part. A box with top and bottom out, will do as well. After filling, cover the top with a close fitting lid, and when cold weather comes, throw over the cask or box a good supply of refuse straw or hay. It is desirable, of course, to have it constructed on a side hill, or with some sort of drainage. A short declining ditch with a couple of rails thrown in with a few cornstalks, and covered, will afford ample drainage. Vegetables will keep as fresh in this as when first deposited.

WALKS ABOUT THE PREMISES.

Portable Walks.—If there is one convenience neglected more than others in the out-door arrangement about a dwelling house, it is the walks leading from the outside door to the different points that are hourly traveled by members of the family. Usually a few planks or bits of boards are thrown down, to serve the purpose of keeping the feet from coming in contact with the dust or mud, as the state of the weather may necessitate.

It is evident that but few realize how easily the matter may be remedied, from the fact that but few provide against it. Portable plank walks may be made for a few dollars expense, which will doubly pay all cost the first winter in comfort, preservation of shoe leather, and health preserved in the household.

Slab Walks.—A cheap walk may be made of wide slabs "spotted" on the convex side at ends, and in center, so that they will rest squarely upon pieces of scantling. Nail the slabs to the scantling securely, making each length a separate section of the walk, so they may be taken up at will or placed in new positions. These, of course, are only to be used around the back of the house.

Stationary Walks.—A stationary slab walk may be made that will last for many years, and not only insure dry footing, but may be passed over with a wagon or carriage without damage. Get wide slabs with straight edges and bring them to uniform width, no matter how long they are, the longer the

better. Excavate a channel in the ground to correspond with the convex side of the slab. Let the flat surface of the slabs appear even with the surface of the ground. After they are firmly bedded, bore two inch auger holes through the slabs about one foot from each end, and drive strong wooden pins two feet long through each hole into the ground.

In case some of the slabs are to be laid over hollows or depressions in the ground, block them up with stones or wood, and haul a load of clay or sods to fill up the low places even with the top of the slabs.

Board Walks.—Take boards of good thickness, or planks, and spike them to scantlings as long as the boards are wide. If the lumber is not more than an inch, a piece of two by four scantling should be put under every three or four feet. A board twelve feet long should have four scantling rests. It is best to make them in sections. After the ground has settled in the spring, the sections of the walk may be taken up and stored away, or if preferred, allowed to remain in their places. On general principles, it is best when you build walks to make good ones; they are not only secure, but cheapest, all things considered.

Sawdust Walks.—Walks are sometimes made by mixing sawdust and sand, equal parts, and confining it in a body, by placing bricks or narrow planks on edges along the outer sides. Leached ashes may be incorporated with sawdust if sand is not to be had readily, serving the purpose nearly as well.

This style of walk is not to be commended where means and material will permit of better. The chief objection is in particles of the material adhering to the feet and being conveyed to the house.

Cement Gravel Walks.—Having previously graded and rolled the ground, heat coal or gas tar very hot, and with a long handled dipper begin at one end of a pile of quite coarse gravel, pouring on the tar, quickly shoveling over and over so as to mix thoroughly. Cover the ground two and one half or three inches deep with the tarred gravel, and then roll. Clean the roller with a broom as you proceed. Then put on a layer of fine tarred gravel one and a half inches thick, and roll. Then sprinkle the surface with hot tar, spreading the same with a broom; finally cover the surface with a coat of fine sand, and your walk is complete and ready for use. It will improve in hardness by age.

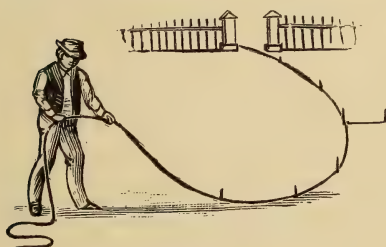
The disagreeable smell that at first arises, especially in the evening, soon passes away. Walks of this kind become very hard, and will stand rough usage.

Asphaltum Walks.—Asphaltum walks are sometimes made by adding lime, as follows: After grading, lay out the walk as wide as desired, then excavate three or four inches. Two by four scantling is then laid down along the sides of the excavation and staked firmly in position. The stakes should not project above the upper surface of the scantling.

In the bottom of the trench, a layer two or two and a half inches deep of

coarse gravel is then spread, the coarsest stones to be no larger than hen's eggs. This layer is saturated with a mixture of hot tar and a little water lime. While this is yet moist, a second layer two inches thick of fine gravel is spread on, and worked down smooth and hard. This also is saturated with gas tar and water lime. A final coat of sand is now spread over this, raising the surface an inch or more higher than the scantling. It is quite important that the walk shall be a little rounding, so as to shed water effectually.

Making Curved Walks.—Where curved walks are desired in lawns,



LAYING OUT A CURVED WALK.

or ornamental gardens, a quick and effectual way of laying them out is by the use of a clothes line, as illustrated. Lay the line until the desired curve is obtained, then stick small stakes along the rope the whole length. Now cut a stick the desired width of the walk, and using this for a spacer, set the second row of stakes, and you have the curves complete.

The stakes should be left in position until the walk is finished.

Clean Gravel Walks.—Where gravel can be readily obtained it may be used profitably for making walks about the house and garden, and will prove not only very durable, but always clean and attractive. The soil should be thrown out where the walk is to be made until a hard foundation is found, even if it is necessary to go down eight or ten inches.

Now fill the excavation to near the surface with coarse gravel, and cover this with fine gravel, free from vegetable mold. If grass works in from the border, give it a drenching with brine, and the encroachment will end at once.

Another way to form the body of a walk is to fill the excavation with blacksmith's and ironfounder's cinders, or pieces of old brick, old mortar, lime siftings, oyster and clam shells, or anything else of a similar character. Then cover the surface with about two inches of sharp, clean gravel, that is free from mold, or anything that will promote the growth of vegetation.

For the under bed broken stone packs better than coarse gravel, but the builder must consult his own conveniences in this matter. Where the ground is flat and retentive of water, a tile drain, a foot or two below the walk, will make a great improvement. Gravel walks, well made, will last generations.

Frequent rolling is one of the best preventives of weeds, as it keeps the surface so hard and smooth that weeds cannot readily grow upon it, and are as liable to be blown off again as they are to be blown there.

It is said that the walks on the Centennial grounds at Philadelphia were covered with a mixture of eight parts of pitch and sixty-four of sand and gravel, which made a cheap and durable cement.

HOW TO BUILD AN ICE-HOUSE.

Location of Ice-House.—The best location for an ice-house is upon the north side of a building, but it should not be under the eaves. The best soil on which to build is one that is sufficiently porous to allow the water to leach through without the necessity of using a drain, as this makes way for a current of air which tends to equalize the temperature within to that without. If the soil requires a drain, the outer end should be so closed up that air currents cannot penetrate the interior. If the soil is not sandy and porous, the site for an ice-house, to be built above ground, should be so elevated that the water from the eaves, and that from the melting ice, can be conducted off without difficulty.

Foundation for Ice-House.—If a very cheap construction is to be built, and the soil is clay, take a few poles, rails, or scantling, about ten feet long, and lay them upon the ground, a foot or so apart, until the breadth of the bed is equal to the length, *i. e.*, ten feet square. Fill between with sawdust, and cover with boards or slabs (one thickness), and put on a good bed of sawdust, and the platform is ready for the ice.

If the soil is porous the builder may excavate three or four feet deep, ten or twelve feet square, and lay down scantling and cover with rough boards for a floor. It is not necessary to excavate, however, but is more convenient for filling. If the soil is gravelly, dig a pit, and fill with round stones, and cover with sand first and then sawdust. The water will escape easily through the sand and stones, and there will be no chance for currents of air to flow upward into the house. Use old sawdust. That which is new is liable to ferment and give off heat when thoroughly packed.

Walls for Ice-House.—After the foundation is ready, at the four corners set up studding, two by eight inch stuff, eight feet long, and at distances of three feet apart, if inch boards are used for cover. The covering boards should be well seasoned, so as to make tight joints. The outer wall, as high as the surface of the ground, may be nailed on the studs before they are set down upon the floor. Board up on both sides of the studs to the top, and pack the earth around the outer wall, leaving it to descend in all directions to carry off the surface water; then fill the space between the boards (eight inches) to the top of the wall with fine charcoal, dry sawdust, or tan bark well packed down; or you may lay rails and put up studding in a double row, and fill between with sawdust or tan bark, well pressed down.

Roof for Ice-House.—After filling up the sides, nail a strip of board nicely over the top, to prevent rats or mice from burrowing within. Upon this the rafters may be allowed to rest, or the roof may be made of whole boards, running up to the ridge, and battened; in either case the roof should project

well over the wall on all sides. Lay on joist before the roof is put on ; nail a floor upon these, and give a good coating of sawdust. This obviates the necessity of double roofing.

The roof should be quarter pitch, either of boards, battened, or shingled. In many parts of the country roofing-paper is employed instead of shingles. Such paper is very strong, and impervious to water, so that after a heavy coat of paint is applied to the surface the roof will be as tight as tin , but I do not like a roof sufficiently tight to exclude air.

Ventilating an Ice-House.—In the gable end of the house a small door should be constructed, that may be opened and closed at pleasure. It may be simply a piece of board six by eight inches, hung with light iron or even leather hinges, and shutting against cleats that have been nailed upon the inside. When laying the floor beneath the roof, saw out a place six inches square, and tack around on each side pieces of board six or eight inches long, extending up as a tube through the sawdust. This is a cheap ventilator.

The Ice-House Door.—On the north side there should be two center posts, so as to form a doorway, which may be supplied with slip-boards on the inside. The space for the door should be no larger than is absolutely necessary—say two and one half feet wide and five feet high. The entrance should be protected by a door on the outside, opening out, and slip-boards used on the other side of the studding for the sawdust or straw around the ice to rest against. This forms what may be termed double doors, leaving an air chamber of some eight inches between the two. The advantages of the inside being of slip-boards, is, the boards may be removed from the top as ice is taken out, making no great exposure to the outside atmosphere.

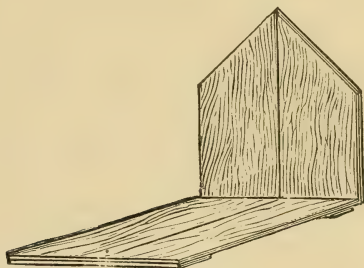
How to Pack Ice.—As a foundation, put in a good bedding of some non-conductor of heat ; spent tan bark, rye straw, charcoal and sawdust are all good for this purpose, but the latter is the best, and the others should not be used if this can be obtained handily ; it is sweet, porous, and does not decay or become musty, so as to affect the ice, and through it is good drainage.

Pack up the cakes when the weather is cold ; fill all the interstices with pulverized ice, and then pour on water, and the whole will be frozen into a solid cake. The cakes should not be placed against the walls, but left off a few inches. This space is to be packed with straw, or, what is better, shavings. When the house is full, put shavings or straw on top. Fine clean shavings of pine or other resinous wood will be found most reliable for covering the ice. The more ice is secured in a body, the longer will it be kept from melting.

Quantity of Ice Stored.—A pile of ice, ten feet square and ten feet high, will contain about twenty-five tons ; one, twenty feet square, and ten feet high, will contain one hundred tons, allowance being made for unfilled spaces. Ice weighs 57 pounds to the cubic foot. Calling it 50 pounds to the cubic foot as piled, any one can roughly estimate the size of house required,

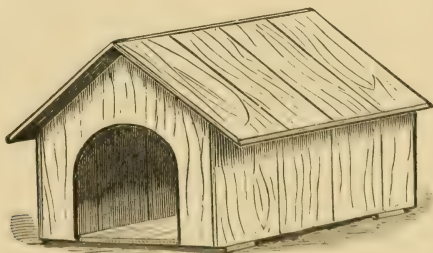
HOW TO MAKE A DOG KENNEL.

Kennel Bottom Board.—For an ordinary dog kennel the floor should be about twenty inches wide and three feet long. The bottom, or floor, is the first thing to make. It may be of two boards ten inches wide, fastened together by cleats six inches wide on the under side. Fasten the cleats on with wrought nails, clinched on bottom.



END AND BOTTOM OF DOG KENNEL.

End Boards for Kennel.—Square one end of a board three quarters of an inch thick and ten inches wide. Measure up one edge twenty-seven inches, and on the opposite side, eighteen inches. Draw a line from one to the other diagonally across and saw off the piece. Lay this on the board, long point to long point, and cut off again by square ends. Set the two long edges together, nail them to end of floor board, and you have one end complete, as illustrated,



DOG KENNEL COMPLETED.

The other end is made in the same way, but the dog hole must be cut before it is nailed on. Lay the pieces together and mark out the door; then with draw-shave or compass-saw cut the curve at top. Cut the door in size to correspond to the animal to occupy it.

After the two ends are nailed on, put in a ridge pole two inches square, of

exactly the same length as the bottom ; and after beveling to conform to roof slope, fasten with two inch screws, put through the end pieces—two at each end. Now you are ready for sides and roof.

Dog Kennel—Sides and Roof.—It will require a board eighteen inches wide and thirty-seven and a half inches long for side, or by putting in a girth on each side, just below terminus of slope of ends, the sides may be covered by boards running up and down. They should be planed to equal thickness, and will be bettered if matched. After nailing on, plane off to conform to roof pitch. If the lumber is too hard for this, saw it as near as you can to pitch and then put a half inch batten board, two and a half or three inches wide, fitted under eaves. Put on the roof, projecting at the eaves, as represented in the illustration.



POULTRY HOUSES, YARDS AND COOPS.

Double Wall Poultry House.—A poultry house need not be an expensive building to be convenient, and to answer well the purpose intended. Designs for hen houses are numerous, but the chief thing is to so construct them that free ventilation can be given at all times ; so that the nests may be reached without disturbing the poultry ; so that feed may be given in variety and easily, and the apartments made light and cheerful. A very essential thing is warmth in winter, and cleanliness should be observed at all times.

Until people pay more attention to providing comfortable quarters for their fowls during winter, and a place where they may be secured during the gardening season, they will not obtain from them the profits that may be desired. Where hens roost in open sheds or trees during cold weather, no eggs may be expected, and if expected they will not be obtained, and where the flocks roam at will during the time of putting in garden seeds, more trouble and vexation is caused to the owner than the fowls are worth.

To make the poultry house warm, double walls are best. The studding should be three inches deep and the outside covering battened.

Lumber for Poultry House.—The inside may be boarded up with old boards and no battens. The expense need not be great. If a better quality of lumber is at hand, or can be conveniently obtained, all the better. Third class pine lumber is good for this purpose. It is claimed that the more pitch the wood contains, the more completely will poultry vermin be kept out.

Size of Poultry House.—A poultry house may be built of any size one may choose ; however, twelve by fifteen feet is large enough for the wants of most people, while one eight by ten will do in many cases. The interior can be

constructed to meet the taste of the builder. There is no well organized plan to be given ; every one will be governed by the number of fowls he keeps.

Construction of Poultry House.—One correspondent says he made a satisfactory house for poultry without much expenditure, as follows : Size, ten by twelve feet ; posts, eight feet high, with third pitch to the roof. He put a floor in three feet from the ground ; left the south end open up to the floor ; made a hole in the center of the floor eighteen inches square, for the hens to fly up from the yard ; a door in south end above the floor, to go in to clean it out, etc., and a three lighted sliding window in the north end, with slats to keep the hens from breaking the glass.

The roosts are put in lengthwise on each side of the floor, the first one being placed about eighteen inches from the floor, and a foot from the side. The next is a little farther from the side and a little higher, and so on till they reach the center, making four on a side. They are put in so they can be easily taken out if necessary.

Boxes are placed in the floor underneath for the hens to lay in. The opening makes it convenient to feed the hens. There are no holes in the floor but the one in the center, and no animal can get at the hens easily, and owls can hardly find the way to them. A trap door can be shut in cold weather.

The egg boxes are made so small that but a single hen may occupy one at a time, and are placed upon racks so that they may be taken down at will and cleaned of vermin after the hen has hatched out a brood. The proper time for gathering eggs is just at nightfall after the fowls have taken to the roost. The loft is entered by means of a door in the back end.

Poultry House Doors.—It is advisable to have double doors to the house ; the outside one of boards and the inside one of slats. In winter, both may be closed, and in summer the outside doors left open, and the lath shut, which affords free circulation of air. There is nothing worse than a close, hot hen house in midsummer.

Means of Cleaning.—A very good plan, given by a poultry fancier, is to keep the floor covered with road sand (obtained in the summer) two or three inches in depth. The roosts, two feet and a half from the floor, are pieces of joist three inches wide, rounded at the top, with a groove one quarter of an inch deep cut in the center, which is filled with kerosene once a fortnight. Under each is a board, two feet wide and two feet from the floor, to catch the droppings, which are removed often and the board sprinkled with lime, air slaked.

Heating and Disinfecting.—A correspondent of the *Country Gentleman* says, that for the purpose of purifying the house, and also of warming it on cold nights, he finds it to be a capital plan to light a small fire of brush or green sticks on the middle of the floor. The doors and ventilation being closed, the house is thoroughly smoked ; all vermin and impure effluvia are destroyed, if

the operation be performed an hour or two before the fowls go to roost, the disagreeable effects of the smoke will have disappeared. In Ireland, where the peasantry are famous for the production of abundance of fine eggs, the hens roost in an atmosphere of smoke ; so that, even if the house should be a little smoky at roosting time, no harm is done.

Convenience must be consulted in the matter of nests, cleaning, etc. If these things are to be attended to inside the house, the latter must be large enough and high enough to allow abundant freedom of motion ; but if the house is very small, it is unnecessary ever to enter it, and one had better arrange it so that the eggs can be reached from the outside, which is easily done.

Octagon Poultry House.—Those desirous of keeping from fifty to one hundred fowls will find the octagon style of a house just the thing for them, says a poultry raiser. It is more ornamental than the oblong house, and economizes room, where that essential is required. The object of placing it on piles is to prevent the encroachment of rats and other animals that prove so destructive to eggs and fowls when not properly protected. The structure is not a costly one ; any person used to handling tools can construct it at a merely nominal expense, adding ornamentation to the structure as he desires.

Size of Octagon Poultry House.—The building is twenty feet in diameter, and six and a half feet high. The sills are four by four, and the plates three by four joists, halved and nailed at the joints. It is sided with inch and a quarter plank, tongued and grooved. No upright timbers are used. The floor and roofing are of the same kind of plank. To guard against leakage by shrinkage, the joints may be battened with laths, or other strips of thin board. An eight square frame supports the top of the rafters, leaving an opening of ten inches in diameter, on which is placed an octagon chimney for a ventilator, which makes a very pretty finish. The piers should be two feet high, and set on flat stones.

Construction of Octagon Poultry House.—There should be a door on the south side, and a small circular window on each of the other sides, latticed to admit air, with shutters to close when necessary. A small opening should be made on the southeast side near the sill, and steps leading from the ground to the opening for the fowls to alight on when going in. There are roosts placed spirally, one end attached to a post near the center of the room, and the other end to the wall ; the first, or lowermost one, two feet from the floor, and the other eighteen inches apart, and rising gradually to the top six feet from the floor.

There is a board floor on an angle of about forty-five degrees, to catch and carry down the droppings of the fowls. This arrangement renders it much more convenient in cleaning out the manure, which should be frequently done. The space beneath this floor is appropriated to nests, fifteen inches wide, eighteen inches deep, and eighteen inches high.

In order to give ~~the~~ appearance of secretiveness, which it is well known the hen is partial to, the front is latticed with strips of lath. By this arrangement a free circulation of air is admitted, which adds much to the comfort of the hens while sitting.

Portable Poultry Fence.—Where it is desired to change the position of the poultry yard, the same may be made with a movable fence (see "Portable Picket Fence," page 61), and constructed in any desired form.

Permanent Poultry Yard.—Where the yard is to be permanent, it may be enclosed by posts and pickets. The posts should be two by four inches at one end, and four by six inches at the other; these posts should be twelve feet long, and three and one-half feet of the lower, or larger end, placed in the ground, and the posts six feet apart. Next spike on three rails of two by three inches each, and finish by strips nailed on the inside of the yard, each ten feet long and three inches wide at the bottom, running to one inch wide at the top and one inch thick, the strips fit closely together at the bottom perpendicularly. A base board, twelve inches wide at the bottom, may be put on, and the strips fitted to it; it may be omitted or used at pleasure; the appearance is better with it.

Cheap Wire and Lath Fence.—Set posts firmly in the ground, six feet high, eight feet apart. Take No. 9 wire, and stretch from post to post outside, fastening with staples made of wire driven into posts. Place three wires one inch apart, one foot from the ground; another three at three feet ten inches from the ground; another three at top of posts. Take common laths and weave in, leaving three inches space between sides of each. This makes the fence four feet high. Then take other laths, picket one end, and chamfer the other like a chisel blade, and interweave among the top wires; then shove the chamfered edge down beside the top of the bottom lath, lapping under wires two inches. This makes a cheap, durable, pretty fence, that is seven feet and ten inches high, and fowl-tight. Wires should be left somewhat slack, as interweaving the laths will take it up.

Cheap Hen Ladder.—Take a plank two inches thick and eight or more wide, place it from the roosts to the floor at an angle of forty-five degrees or less, and upon the upper side nail little cleats one inch square, and length of the width of the plank, five inches apart. This is a cheap and useful convenience, and the hens very soon learn to use the device.

Coops for Chickens.—It is a very common custom to shut a hen up in a small box or barrel, with stakes driven at one end, to allow the chicks to run out. This is unkind treatment, for it is as natural for a hen to scratch for her young as for a mother to fondle and talk to her baby, and besides, this wallowing is healthy for poultry—it is the natural means of destroying vermin. When building coops, have a compartment where protection against storms is perfect, and where rats, etc., may be shut out at night; but, in addition to

this, a good yard should be made, where the hen may have full access to the earth.

How to Make a Chicken Coop.—A contributor says, that for a coop in which to rear very early chickens, he has adopted the following device, which is very satisfactory, as it affords light and warmth :

Closely fit a window sash into a large dry goods box or frame made from boards for the purpose, for the front of the coop, leaving a space of four or six inches above the sash for a ventilator. Have a slope of five or six inches to the roof. Partition off in the rear end a foot or more of space in which to feed. Place the entrance at the side, and keep the coop dry and clean. In this way we can have light and comfortable quarters for early chickens, and they will be safe from the depredations of all their enemies. When the sash is no longer needed, it can be removed and slats put in its place.

Portable Coops for Fowls.—A correspondent says, that he keeps his fowls during summer, in portable coops on the grass, moving them each morning. He finds the plan convenient and profitable. His coops are cheaply and easily made. They are twelve feet long by four feet wide on the ground, the sides running to a point at the top. About four feet at one end is inclosed for a roosting place, and less space at the other end for nests. To strengthen the sides he nails a strip half way up on each side, the ends of which extend so as to form handles for moving the coop. In such a coop he keeps ten to twelve hens. They are allowed to run at large when they will do no damage, but during most of the summer are kept in the coops.

THE APIARY.

Cheap Bee Hive.—On the subject of hives and houses for bees, a whole book can be written, but here only a few hints will be given for the benefit of those who wish to make a start and have not the means for patent hives and expensive outfits. Any one outside of a city may keep bees, if he so desire, with good returns, and but a trifling expenditure.

Bees are not very particular as to the external appearance of their habitations. They will store honey in a nail keg, a box, a gum or hollow tree. A very good proportion for a common box hive is fourteen inches square, by sixteen inches in height. The lumber should be of two widths, twelve and fourteen inches, dressed both sides. This, when nailed together, will make the inside twelve inches square, providing the lumber is one inch thick, which it should be to hold nails well.

How to Make a Bee Hive.—Saw two boards twelve inches wide, seventeen inches long, and two of the fourteen inch lumber, same length. Cut

one end of each by a carpenter's square. Then nail together, looking out only to get the bottom square. Let the top come as it will. One of the twelve inch pieces should be set nearly half an inch higher than the others. This is to be the front, and will leave an opening for bees to pass in and out.

The hive is to rest upon only three sides. After nailing the body together, square the top all around and saw it off so as to leave it sixteen inches high. Now make a top board sixteen inches square. This will allow a projection of an inch on each side. If the cap or top does not set down firmly, the use of a plane will soon adjust it. Nail on securely, then bevel the top back two inches, and half the thickness of the board. Do this all around for appearance' sake. It may be done with a draw shovel and smoothed with the plane.

Now in the center of the front and back and six inches below the cap, bore five-eighth holes, and drive a rod through, cutting off the ends smooth with outer surface; then in center of the two other sides and five and a half inches below cap, bore two more holes and drive a rod through; this will pass just above first rod, and a cross will be made in the center which will answer for a comb support. The hive proper is now finished. Paint or not, as you see fit. It is not important, unless one is proud. Some bee keepers claim that it is better not to paint, as the moisture accumulating on the inside penetrates the wood and is evaporated from outer surface when not painted.

If a box that will answer for a hive is already made, or one forgets to leave the opening for the bees to enter, just bevel the outer edge up an inch or so on one side, and so far back as to make the resting portion thin; then with a saw cut numerous notches the whole length, half an inch deep and same surface width, after the manner of saw teeth, and the bees will enter through these holes.

To Make a Honey Cap.—This may be seven inches wide, six inches deep and eight long, open on the bottom side, which should be the large surface. Before nailing together, cut out of one end-piece a hole four inches square; over this hole lay a piece of window glass four and a half inches square. Cut as directed under head of "cutting glass," and mark around the edge with the point of a sharp knife; then let the glass in just its thickness, and secure by cementing.

The cementing should be done after nailing the box together. Now make a little cap to cover the glass, and fasten this with a couple of screws on outside, so as to make the box dark, for bees will not work in the light. Now bore two or three half inch holes in a row in the center of the top of the hive, making them smooth, and set the cap on, and the whole is ready for an occupancy.

The cap need not be put on until well into the summer, as the bees will deposit no honey therein, until they have laid in a winter store below. None but the finest make of honey will be stored in the caps.

By removing the cover to the window, it can be told when the box is filled;

and then by sliding a sheet of tin under the cap to shut the bees off, it can be removed, emptied and replaced. A vigorous swarm will sometimes fill the cap twice in one season.

Hiving Bees.—When the bees swarm, it is not necessary to rattle tin pans and throw water; a swarm will almost invariably settle before leaving for the woods. After they have settled, place a common dinner table under the limb where they hang, spread a sheet over it, then set the hive upon the sheet just to one side or directly underneath the cluster; put sticks under the front corners only, so as to allow plenty of space for the bees to pass in; then jar them down upon the table by a sudden blow upon the limb. They will rapidly make their way into the hive.

If they have alighted too high to be jarred down, use a basket made as follows:

Hiving Basket.—Take a rake handle, saw it off square above the crook for the rake head, then screw firmly to the end a piece of three-quarter inch board, about six inches square. Upon this board set a large tin pail, wooden pail or flat bottomed basket, and nail, tack or screw down firmly, as shown in the illustration.

Line inside with letter or other calendered paper. With this device the bees may be taken down with little trouble and put upon the table. Jar them into the basket and empty in front of the hive. A veil over the face and buckskin gloves will protect those who are afraid to handle bees. Set the hive upon the permanent platform at night.

Stand for Hives.—The stand or platform upon which the hive is to stand, should be beneath the shade of a tree, or protected from the sun by a structure built of boards.

N. C. Mitchel, a good authority on bees, says: "We recommend that the hives should be set on low stands near the ground. Whatever is the mode of construction of stands, I would recommend to you to place them close to the ground. The benefit to be derived from this plan is, that weak or fatigued bees, if it should happen to be windy, are likely to miss the stand and fall on the ground, and, as they can crawl when they are unable to fly, they make their way to the stand and enter the hive and are saved; while if the hive had been some one or two feet from the ground, they would undoubtedly perish."



BASKET FOR HIVING BEES.

The platform should incline a little to the front, so that water will run off,

and, besides, it aids the bees in clearing rubbish out of the hive. The platform should also project in front of the hive an inch or two, to give a lighting place. By giving a little backward slant to the bottom of the hive, the pitch of the platform is overcome.

Winter Bee House.—Prominent bee men recommend the construction of winter quarters for bees, of straw, of any requisite size, building two walls, that is, an outer and an inner wall of straw; the straw is confined by stakes, and the space between the two walls to be filled with sawdust, or something of that nature; a cheap roof, and one door. Such a place might be made cheap, and very warm and comfortable. It need not be very large. It can be modeled to suit yourself.

As a more expensive affair, after considerable progress has been made, Mr. Quinby recommends a room built as follows: The room for this purpose is eight by sixteen feet, and seven feet high; without any windows; a good coat of plaster is put on the inside; a space of four inches between the siding and lath is to be filled with sawdust. Under the bottom construct a passage for the admission of air, another overhead for its exit, to be closed and opened at pleasure in moderate weather, to give them fresh air, but closed when cold, and so arranged as to exclude all light. A partition also extends across, so that when putting in or taking out, one need to disturb only one half at once. He says he has wintered bees in this manner for years. Such a room will accommodate about one hundred stocks of bees. The room with same proportions, as to length and breadth, can be made of any size.

To Make a Bee Feeder.—Thin floats of wood laid upon a dish of sirup answers a very good purpose. The sirup is made of melted white sugar, and the wood floats are to allow the bees to get the feed, without their feet coming in contact with the glutinous material.

The *Bee Journal* says that a good feeder may be made out of old fruit or oyster cans. At the tinsmith's you can get zinc shoulder and screw top, such as are used on kerosene oil cans. Those of one inch in diameter are the right size. Take the top and from the inside punch holes with the end of a file (small holes), being careful not to deform it. After punching eighteen to twenty holes evenly, turn and file the top smooth. The end or edge of the shoulder will fit most of the cans in the crease around the hole made for the cover. Fit and solder. Thus for one dime you will have a good bee-feeder as any yet devised—one that you can feed on sirup with, thick or thin, or water your bees in winter or spring.

Or you can have a neck fitted around the opening in the can, and by tying a piece of muslin over the end of the neck, you will accomplish the same purpose with a little less trouble.

To use, fill up with honey, sugar and sirup, or water, and place the neck in a hole over the cluster of bees.

CONSTRUCTION OF LADDERS.

Lengths of Ladders.—There should be two or three ladders of different lengths upon the premises of every one. They are always handy about buildings for making repairs, and especially useful in case of fire. One ladder should be long enough to reach above the eaves of the highest building, and another of about eight feet in length for training vines on trellises, over windows and door-ways, and for fruit picking; and the third, between the two, is convenient for the same purposes where a higher point is to be reached, and for painting buildings.

Material for Ladders.—The best material for making a ladder of ordinary length is red elm, sawed out one and one fourth of an inch thick. Where a longer ladder is desired than can be made conveniently out of saw-mill lumber, a pole from the forest is best, and for this many kinds of wood are used, such as white and black ash, cedar, cherry, tamarack and bass-wood, the latter being preferable, as it is very light. The rounds should be of the very best material, second growth hickory, oak or ash. They are as good split and worked out by hand as if turned, but do not look quite so well.

To Make a Short Ladder.—When the ladder is to be from ten to fourteen feet long, four inches wide at the foot, and three inches wide at the top, will be found about right for sides. After they are planed off and ready for boring, fasten them together either by clamps or nailing lightly, and lay off the points for the round holes fourteen inches apart, and bore with inch auger through both pieces at once; a three quarter auger may be used to bore the upper portion of the holes if preferred.

As to the width, it may vary to suit the convenience of the maker, from twenty-two to twenty-six inches at the bottom, and from fifteen to eighteen at the top. Eighteen and twenty-four is an ordinary size. For fruit picking, a narrow top is more convenient than a wide one.

To Make a Long Ladder.—The most trying spot in a long ladder is in the center; therefore it is a good plan to make that part a little heavier than the ends. If sawed material cannot be obtained of sufficient lengths for a long ladder, it may be made from a tree. Cut a straight tall pole six or eight inches through at the butt; lay it up to season in such shape that it cannot warp, and if bowing, bring it into line and let it remain so a few months, then shave it to proper size, which is about three inches thick, and the other way five inches in the center by three or three and a half at the ends. Now saw in two, so as to have side pieces one and one half inches thick.

To bore the holes for the rounds, place the side pieces in position upon the floor, then with straight edge and pencil mark across the edge once in twelve or fourteen inches, and these marks will serve as guides for the auger in boring

holes for the round. If the spread of the ladder is thirty inches or three feet at the lower end, the bottom rounds should be inch and a quarter, while at the top, where the spread is not more than eighteen or twenty inches, inch rounds are sufficient. In a tall ladder the space between rounds should not be great, not over fourteen inches, and a foot is better where heavy loads are to be carried up.

Putting in the Rounds.—Make the rounds with slight shoulders and set all of them in one side piece first, and then put on the other side. It is best to give the ends of the rounds a coating of white lead and oil before putting the ladder together, as it will add greatly to the durability of the wood by keeping water from penetrating. Wedge a sufficient number of the rounds to prevent the ladder from coming apart. Plane the sides after sawing off the projecting ends, sand paper smooth, and with a rag or brush give the whole a good coat of linseed oil.

Very nice looking rounds can be made by squaring the stick and the chamfering so as to make it eight square or octagon.

After the ladder is finished, it should receive two good coats of paint; blue, white and red are appropriate colors. If the painting cannot be readily done, coat with linseed oil as before suggested.

Paint and Fruit Ladders.—In the way of short ladders for fruit picking, painting and household uses, there is no device equal to the regular step ladder, and one of these may be purchased, if time is valued, for much less than it can be made. But there are devices for fruit ladders and ladders for general use combined, which may be made at home and at trifling cost. A double ladder may be made of inch hard wood boards five inches wide, with either rounds or board steps, that will be self-supporting, and may be separated for other uses.



DOUBLE FRUIT LADDER.

Another device, from the *American Agriculturist*, is very good, as it may be applied to any common ladder.

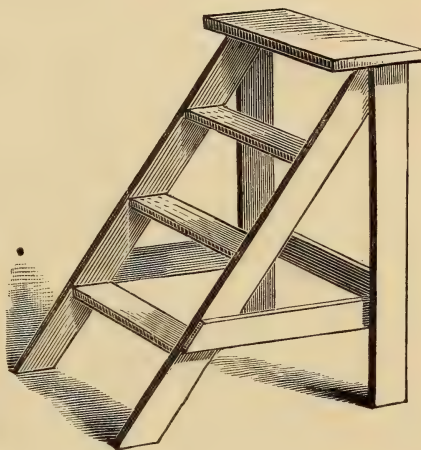
The peculiarity is in the support, which consists of two stiff poles, very nearly as long as the ladder, fastened together by a bolt near the top, so that the bottoms may be moved apart or nearer together. There are two strong hooks inserted in these poles below where they are bolted together, and upon these one of the upper rounds is made to rest, as shown in the engraving.

Cheap Step Ladder.—A very convenient thing to have about the premises is a step ladder made after the style of the illustration. It is handy for fruit picking, painting, window washing, etc., and may be used in places where the folding step ladder cannot be taken. The following are proper proportions: Top, or foot rest, twenty inches long by nine inches wide, and one inch

thick. Straight legs four inches wide and three feet long. Step supports five inches wide and forty-four inches long. Side pieces about twenty-two inches long and four inches wide. The back piece four inches wide and eighteen inches long. The ladder should be eighteen inches wide, which will allow the top to project an inch each side. The steps should be wide enough to correspond



DOUBLE BRACE FRUIT LADDER.



HANDY STEP LADDER.

with the bracing legs, and three in number, at equal distances apart. They should be grooved in, but if one is not prepared to do that, they may be held in place by three two inch screws at each end. Whitewood boards, three-fourths thick, are heavy enough for all but the top.



CONSTRUCTION OF LIGHTNING RODS.

Uses of Lightning Rods.—Lightning rods are not wholly for the purpose of conducting flashes of lightning to the earth, as is very commonly supposed, but they are a means of safety to buildings, by silently transmitting the electric fluid from cloud to earth during thunder storms, and no doubt many times prevent disruptive discharges.

Defects in Putting up Rods.—The rods should be well put up; if not, they are no protection. If the joints are so constructed as to become partial insulators, a heavy charge of lightning will very likely leave the rod and do great injury to the building.

Another important point in the putting up of rods is to have them extend into the ground far enough to reach moist earth. Dry earth is a poor conductor, and water a good one; so, if the soil at the end of the rod is dry, electricity will sometimes collect and make off to some point of attraction.

There have been many instances where explosions have taken place after the electric fluid has reached the terminus of the rod, and nearly ruined the foundations of buildings. There is no danger of sinking them too deep; so put them down as far as they can be conveniently driven.

Size of the Rod.—The conducting power of bodies is said to be in ratio of their surfaces. If that is the case, the more surface given lightning rods the better protectors they become as conductors of electricity. To be safe conductors, they should not be less than one half inch in diameter.

Professor Henry, of the Smithsonian Institute, says that a rod should consist of round iron of about one inch in diameter; its parts, throughout the whole length, should be in perfect metallic continuity, by being secured together by coupling ferrules.

His theory of plenty of surface is all well enough, but will scarcely be adopted for common use on account of extra expense required.

Shape of the Lightning Rod.—As to shape, it makes no odds whether they are square, triangular or round. The object is to have sufficient iron in the rod to conduct the electric fluid away from the building when the atmosphere is very highly charged.

Height of Rod Above Roof.—As to the height the lightning rod should extend above the building, the whole depends upon the size and extent of the edifice. It is claimed that the rod protects a radius twice the length of the rod above the roof, and if this be correct, it would be necessary to put two or more rods upon some buildings, as one rod could not be easily supported at the height required. On dwellings, the rods should run up beside the chimneys, as at these points a special protection is required.

Fastening and Coating.—It should be fastened to the building by iron eyes, and may be insulated from these by cylinders of glass. To secure it from rust, coat the rod with black paint, which is itself a good conductor.

How to Put up a Rod.—The more direct the course of the rod to the earth the better. Wherever it is necessary to bend the iron it should be done in a regular curve, and never given a right angle.

It is claimed by some who have given the subject a great deal of consideration, that the rod should in no place be allowed to sag; that is, so that the electrical current will be required to go up hill. There appears to be ample proof to verify the statement that a thunder-bolt that will pass down a very small wire, will break or leave a much larger one when going up. If this is a fact, it is not good policy to lay a rod along the ridge of a house, because there will be sunken spots between the supports.

One writer claims that in examination of many houses that have been struck by lightning, when supposed to be protected, he has found a sagged rod in every case, and further, that the electrical current left the rod at the very point where the ascent begun.

Platings as Protections.—It is a well-established fact that metallic platings, eaves spouts, etc., are frequently the means of preventing disasters in storms. Arago says that the temple at Jerusalem, for a period of a thousand years, situated on an eminence in a region where thunder storms are common, was never struck by lightning. The reason plainly is that it was protected by its thick gilding, it having been entirely overlaid with gold; and each end of the roof was adorned with a long row of lances, made of iron, pointed at the top, and gilded.

Metallic pipes for water conductors also extended from the roof to the cisterns situated under the porch. The building was therefore admirably protected from danger by lightning, in close accordance with the most approved principles of modern science.

Buildings unprovided with rods have sometimes been struck by lightning at the ridge, the fluid passing along the cornice until reaching the eaves spouts, and thence to the earth, harmlessly.



TRELLISES FOR VINES.

Wire for Raspberries.—A wire trellis makes an excellent support for raspberry bushes, inexpensive and durable. Good oak or cedar posts should be set along the line of the canes, twenty-five or thirty feet apart, and No. 14 wire stretched thereon. A very good way is to set posts four by eight inches the broad way across the line of raspberry bushes, and then attach wires to each side. If the width is not sufficient, cleats may be put upon the posts, or staples driven, which will make greater space between the wires.

Trellis for Grape Vines.—Upon this subject I cannot do better than give the experience of a professional vineyardist.

To Prepare the Wire.—"The coils, a few at a time, are thrown on a wood fire on the ground, and made hot enough to burn off all dirt, and become well annealed, and when sufficiently cool to avoid burning the varnish, are passed through a mixture of coal tar and paraffine. The mixture should be placed in a trough near a stake, the stake being used to lean the coil against, while it is turned around with a stick in the mixture. My vines are planted eight feet apart in the row, and the posts sixteen feet apart, which is near

enough. At each end I set an additional post, eight feet inside of the end one, and brace by placing a stout rail between them.

How to Put up the Wire.—"When ready to put up the wire, make a sled (for convenience in moving about) four feet long and two feet wide. A turn table large enough to accommodate the largest coil is made, which works on a pin at the rear end of the sled. This should be bored with inch holes at various distances, to accommodate the different sized coils.

* Place the coils on the table, put pins in the holes to hold the coils as near the center of the table as possible, take hold of the wire and walk with it to the end of the row and fasten it around the post, commencing at the top. Previous to this, one hand has passed along the row and driven into each post, at the distances it is proposed to have the wires apart, six-penny wrought nails, half way of their length, and inclining a little upward. The wire is now placed on these nails and the stretcher applied.

The Wire Stretcher.—"The stretcher is a very simple arrangement, and powerful enough to take out all crooks and even break the wire. It is similar to a common step-ladder, but has only three steps. It is eighteen inches wide and six feet long. Legs are fixed at the top near the outside, which work on pins independent of each other, so that they may be placed on uneven ground, to properly brace back the stretcher and keep it from turning around. As many places are sawed out of the sides of the stretcher as there are wires to be put up.

"The lower wire should be two feet from the ground, which gives room for hoeing. The next one should be twelve inches above this, and the upper one eighteen inches from that. A roller about six inches in diameter works in the places sawed out in the stretcher, which is worked by two levers placed four inches from each end.

"A small hole is bored in the center of the roller with a gimlet, to put the end of the wire in. After tightening the wire, place the last rod so that it will hold the roller by placing the other one crosswise behind it, turn up the nails loosely over the wire, except the two or three at the end next the stretcher.

"Double and drive these nails up tight to hold the wire when the tension is taken off. Turn back the roller, and wind a little surplus wire around the posts for slacking with in winter.

Slacking the Wire in Winter.—"The end posts should be six feet high, or, in other words, should be a foot higher than the top wire to lean the stretcher against. At setting in of cold weather, I loosen the tight nails at the end, and unwind the wire from the post for the winter. It is not necessary to have the wire very tight at any time except for appearance. I stretch pretty tight at first to find out weak places and get out crooks, and then slacken up again before driving nails."

SCAFFOLDINGS FOR BUILDINGS.

Permanent Scaffold.—There are two essential things to be observed in building a scaffold: First, safety; second, convenience. Carpenters understand these things, but sometimes the unprofessional wishes to make repairs upon buildings, new roofing, etc., and a few hints may be valuable. Beside the new frame of a building, where the studding is exposed, it is not a difficult matter to build a secure staging to work upon, but somewhat so to construct a scaffold beside a solid wall.

To erect one that will be secure, take as many pieces of scantling—fence rails or poles will do—as will divide the breadth of the building into spaces of eight feet, or, in other words, to have a rest or support once in eight feet. Find the distance from ground to eaves and make the staging two or three feet less in height by nailing to the scantling pieces of board three feet or more long, at right angle. Take some inch and a half planks about two feet long and four or five inches wide, hew off one edge to half an inch thickness, *i. e.*, one edge full thickness, the other half inch. Now fasten these pieces to the three feet boards, at further end from pole, up and down, same as pole. Drive nails through board into the thick edge of the plank. Now the thing is ready to elevate. Set up so that the planks come against the siding over a post, and through the thinner part nail firmly to the house. The two scantlings which come at the ends of the house will not need the plank pieces, but the boards should be a foot or so longer to project by, and be nailed to the house ends.

After the scantlings are all up, nail strips from one to the other outside, to prevent the scaffolding swaying. In putting on the platform lay boards on first two supports, then skip a space and lay on again; then put boards over space skipped; that will make them lie even. The staging should not be any wider than necessary to give working space. Where the eaves project a good deal, the boards for rest will have to be longer than dimensions given, perhaps four or five feet long. There is usually a mistake made in scaffold building by having them too low. If when standing upon the staging the eaves come to the breast, it is a difficult matter to get upon the roof and down again. If built well up, the work will be found very easily performed.



PORTABLE SCAFFOLD.

Portable Scaffolding.—Take two pieces four by four scantling, three feet long, halve them together at one end at right angle, and bolt them. Brace them well by means of two side pieces of inch board, that they may be quite firm. Next, take a long pole or scantling, from ten to twenty feet, according to the degree of elevation wanted, and cut one end of it to fit nicely into the angle already mentioned, when the pole itself, or scantling, stands at an angle against the side of the building. Repeat this process—that is, make one or two more of the same, and your scaffold is complete.

By simply moving the lower ends of the poles nearer to, or farther from the base of the building, the entire scaffold is raised or lowered. The illustration will give an idea as to its use.

DOORYARD ROCK WORK.

Plain Rockery.—People do not generally realize how much beauty may be added to the dooryard or lawn by the bringing together of a few rocks and placing them in classical position, and decking with plants. Once built, the work is done for a lifetime.

To Lay Out a Rockery.—W. A. Lindon, of Virginia, thus describes his way of doing the work, which, certainly, any one can imitate :

“I took a cord with a little stake at each end, stuck one of these in the ground as a center, and now, with the cord eighteen inches long to the other stake, I marked off a circumference line around the center, giving a space one yard in diameter each way for the rockery to occupy.

Building the Rockery.—“I now placed my largest rock in the center, then selected five rocks as much alike as I could readily find over a foot tall; these were set up as pillars at equal distances along the circumference mark.

“A wheelbarrow of good soil was now thrown in the circle, and pressed between the rocks, some care being observed in pressing the soil so as to incline the pillars a little inward, to secure a conical shape. Mosses and vines were planted between the spaces of the pillars.

“Now about one foot high in erection, long, narrow rocks were placed on each pillar, with one end resting on the center rock; then narrow rocks put across from pillar to pillar. Made in this way, a rockery never tumbles down. Fill in with soil, continuing to plant vines and mosses in the interstices.

“This process was continued till the building was five feet high—the conical shape well preserved till near the top, which was left flat for a pot of bright flowers. Two dozen white porter bottles were inserted promiscuously in the soil as far down as their necks would extend in the rockery.

Location of a Rockery.—"The best of it is, the rockery is on the northern side, in a locality where it is difficult to get roses or other desirable plants to grow, and it is almost as pretty (quite as attractive) in winter as in summer.

Decorating a Rockery.—"The mosses, five varieties of different shades of green, are all hardy, and the vines, silver edge, solid green, and golden edge, have twined themselves most lovingly around the bottles and among the mosses, presenting thereby a most pleasing contrast. A pot of bright flowers is usually kept in the top, and changed as they go out of bloom for another in bloom."

Fountain Rockery.—Another gentleman contributes his plan of building a rockery and fountain combined. He says:

"I made my fountain from a coal oil barrel, six feet of lead pipe, and one tin tube eighteen inches long gradually tapering to a small point. The barrel was cut in two pieces, one-third in one and two-thirds in the other; the latter I elevated to give power to the water serving as a reservoir; the former was sunken a short distance from the larger one and served as the base of the fountain. I passed the lead tube through the small tub near the bottom, and let the end come nearly to the middle; here it was bent upward, on which was securely placed the tin tube, on the top of which I placed a very small thimble perforated with very fine holes. The tub was then duly decorated with bottoms of oil lamps, fancy sticks and other odds and ends, until it had the appearance of being made for the purpose.

Fountain Plants.—"The fountain being in perfect order, I commenced with the rocks and built them up naturally and promiscuously. Where I wanted my plants I would sink a pot and pile the rocks and moss around. Near the water's edge I placed my fuchsias, ivies, moneyworts, water lilies and such plants; next came the achyranthus, some coleus and a few fuchsias; then geraniums, heliotropes, roses, abutilons, pomegranates, oleanders, etc., the larger reservoir being effectually hidden from view by the glossy leaves of the Madeira vine and the dark green of the Irish ivy.

Fountain Basin.—"After the work was done and moss ferns and other wood plants were sprinkled in every crevice, the fountain was set at play; then the wonders began; everything ran wild and reveled in the rankest growth; even the frailest fuchsias grew robust and strong, and were loaded with bloom all summer. The inside of the fountain base was lined with small stones, shells and pebbles, held together with moss; and a few sagittars were planted in the water.

"Then by the addition of four or five fishes from the brook the fountain was completed, pronounced a success, and turned over to the wood sprites and water elves. For if there are such things they would be sure to select such a place as this for their midnight revels.

Stone for Rockery.—"My rocks were only the common limestone, my shells were mussel, in fact, although my materials were so common and the work all home made, still I think if you could have seen it you would say it was justly entitled to the *blue*. I would like to hear of a dozen being made after my pattern, only better; and know that any one who will take the pains can make a rockery that will embellish the yard with new beauties, and be a continual source of pleasure all summer. Make it where a tree will shade it just at noon, and then you will succeed."

HOW TO MAKE A HOT BED.

Starting a Hot Bed.—The time for starting a hot bed depends somewhat upon the locality and the season. Generally they should be made between the 15th of February and the 1st of March.

Location for a Hot Bed.—Select a place where a good, free southern exposure may be had, and protection from north and west winds, obtained by building hedges or board fence. A side hill with incline to the south is a good location, as it is a warm locality, and affords good drainage.

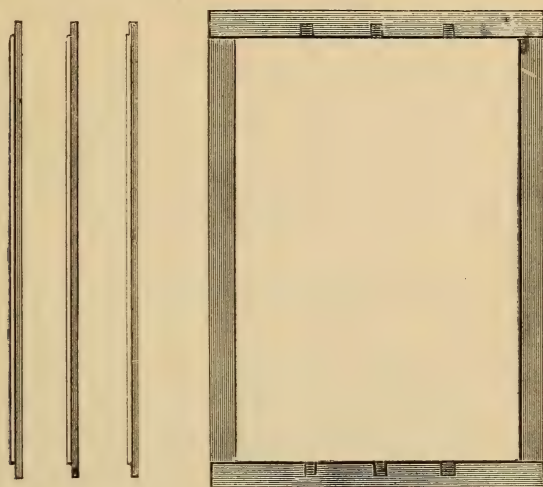
Size of the Bed.—For the supply of an ordinary family, make a frame of two inch boards (if you have them, if not, lighter ones will do), say about ten feet long and five feet wide, or, what is better, procure about four pieces of hot bed sash, about three feet wide, and five or six feet long, and then make your frame so that these will cover it snugly, projecting a little at the lower side to afford eaves to the bed.

Slant of the Frame.—The proper slant of your box should be about one inch to the foot, that is to say, the back board should be twenty inches high, and the front one fourteen inches high, if your bed is six feet wide, and then put a two inch strip across the bed where the glass laps at each place. Those strips should be let into the back and front boards to make them level, so that in moving the sashes back and forth, there will be no difficulty; and so they will keep out the cold winds.

How to hold the Frame.—Procure four stakes—pieces of scantling are best—and sharpen one end of each; drive them firmly into the ground at each corner of your frame, to which spike your frame, thus making it firm.

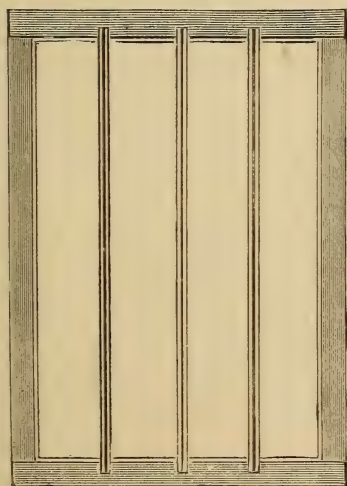
The Hot Bed Pit.—Dig a pit a little less than your frame, and inside of it, so deep that from the top of the frame to the bottom of the pit shall be thirty-five inches. If your land is not underlaid with gravel so as to leach the water down readily, you must cut a drain which will drain it quickly, and to the very bottom; do not neglect this, for you might as well try to make a fire in water, as to raise the heat in a hot bed while saturated with water.

Manure for the Bed.—Get some long or undecomposed manure, that which has never been moved is best, though any will do that has plenty of

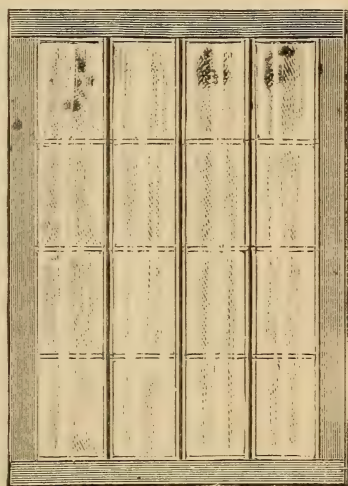


NO. 1. SASH FRAMED READY TO PUT TOGETHER.

litter in it, such as straw, hay or corn stalks; if mixed with sawdust it will do, though it will not heat quite so quickly, but the heat will continue longer.



NO. 2. SASH READY FOR GLASS.



NO. 3. SASH WITH GLASS PUT IN.

With this fill your pit about eighteen inches, shaking your manure well, so as to break all the lumps, at the same time tramping it firmly and evenly all over the

bed. If the manure is too dry, you must dampen it as you fill. Sprinkle on the water plentifully, for if too dry, it will not heat at all.

If it is desired to hurry up the bed, hot water can be used to wet it down with.

Soil for the Seeds.—Get the best loamy soil that can be obtained, and cover the heating material to the depth of six or eight inches, leveling it off nicely; when this is done the bed is finished, but it has to be warmed thoroughly before sowing the seed; it is warmed by putting on the sash. Bank up carefully to near the top, and then let it stand to heat up until the first or rank heat passes off, which will generally take about four or five days. It is now ready to receive the seeds.

Cheap Hot Bed Sash.—If situated so that sash cannot be easily obtained by purchase, one may be made without requiring any great amount of mechanical skill.

Three sections should be made for a bed that is nine or ten feet long. It is best to make the sash first, and then make the bed to the three sections. Forty-eight lights of glass, eight by ten inches, will be enough to cover a bed nearly ten feet long and five feet wide. Make three frames of lumber three inches wide and an inch and a quarter thick, thirty-nine and a half inches wide, and forty-three and a half inches long. Simply halve the corners together and cover with white lead paint, and screw firmly. Now find the exact center of the inside space from side to side, and halve in a strip one inch square. Then find the exact center of the two parts and halve an inch square stick into each of these, as shown in No. 1. Paint the connections and screw these in firmly as in No. 2. Down the centers of the three inch strips tack pieces half an inch square directly in the center. This will leave one-fourth of an inch on each side for the glass to rest upon. Nail half inch strips also down each side one-fourth of an inch from the inside edges. Paint well as tacked on. It will be found that the glass will fit closely between the strips.

Lay the first light lapping one-fourth of an inch upon the end piece; then lay on the second light lapping one-fourth of an inch, and so on to top, fasten in place by headless tacks or tins, and putty as in No. 3. Do not put cleats at top or bottom, as these will not allow water to run off freely.

If one is sufficiently skilled in mechanical arts to mortise and tenon the frame together, so much the better; but if made after the simple form given, and well cemented with good, white lead and linseed oil paint, it will last a lifetime when exposed only for propagating purposes.

After Care of Hot Bed.—After the seeds are planted the work is not completed. Frost must be guarded against, and possibly the bed may get too warm. Should it become too much heated, there must be air admitted by raising the sash sections at the back end, or better, raise them in the middle, which will give a freer and more uniform circulation of air. By putting your

hand down into the soil of the bed you can tell if the bed is too hot. To prevent the bed getting too cold, cover with straw, hay, rushes, or in fact almost anything to prevent the escape of heat. Leave the sash on until the plants have shown themselves, only removing the other covering in the middle or hottest part of the day; but when the plants are plainly discernible, you can put an inch block under the ends of the sash to admit air.

Straw Mat Covering.—Straw matting makes the best covering for a hot bed, and may be easily constructed. The first thing is to make a frame by nailing two side strips about three feet long on two end pieces three and a half feet long, of inch boards, about two inches wide; then tie across this frame lengthwise, four strong cords like hemp wool twine; the frame will raise these strings about two inches. Lay on good straight rye straw; take light, strong twine, wind some on small short sticks; then with one of these to every main string, commence fastening. Shove the straw up close, take a half hitch around the straw, then continue on all four of the strings, until the mat is finished, which should be about four feet long and three feet wide. Cut the ends of the straw even.

Leaves for a Hot Bed.—An old market gardener tells me that he has used forest leaves in his hot beds for a quarter of a century, and believes them to possess advantages over manure alone. He says that he generally commences his hot beds about the last days of February, if the weather will permit, for early tomatoes, egg plant, etc., using half leaves and half horse manure. As soon as tomato plants are six inches high, make more hot beds, using three-fourth leaves and one-fourth horse manure.

He has used above fifty cords of leaves in a season, which afterward made some seventy-five loads of good manure, which is first-rate for composting fish offal, and will nearly pay the expense of making hot beds.

Cheap Hot Bed Cover.—A correspondent says that one of the best materials for covering frames besides glass is common white muslin, coated with the following composition: Take one quart of linseed oil, one ounce of sugar of lead and three ounces of resin. Pulverize the sugar of lead in a little oil, then add it to the other materials.

Put all into an iron kettle, and heat it until the resin is dissolved, and the other ingredients are thoroughly mixed; stretch the muslin upon the frames, and apply the composition while hot. Frames prepared in this manner will last several years, if kept under cover when not in use.

The German Hot Bed.—Take white cotton, of a close texture, stretch it, and nail it on frames of any size you wish; mix two ounces of lime water, four ounces of linseed oil, one ounce of white of eggs and two ounces of yolk of eggs; mix the lime and oil with a very gentle heat, beat the eggs separately, and mix with the former. Spread this mixture with a paint brush over the cloth, allowing each coat to dry before applying another, until they

become water proof. These little, rough, square boxes, of the proper size and height, covered with the prepared cloth, can be placed over the hills in which tomato, melon or other seeds are planted, and the plants allowed to stand, without transplanting, until all danger of frost is over, when the boxes may be taken off and packed away carefully for another season.

The advantages claimed are, that the cost is hardly one-fourth the other style; that they are light and do not require watering; no matter how intense the heat of the sun, the plants are never stricken down, or faded, or checked in growth; neither do they grow up long, sickly and weakly, as they do under glass, and still there is abundance of light.

The heat entirely arises from below, is equable and temperate, which is a great object. The vapor arises from the manure and earth, is condensed by the cool air passing over the surface of the shade, and hangs in drops upon the inside, and therefore the plants do not require so frequent watering. If the frames or stretchers are made large, they should be intersected with cross bars about a foot square, to support the cloth.

To Make a Cold Frame.—The cold frame differs from the hot bed only by having no bottom heat. Make the frame with same incline, and facing either east or south. Many prefer the eastern exposure, as the bed gets the morning sun. It may be constructed of rough boards, two feet high in the rear of the bed, and only one in the front. The soil in cold beds should be of good quality of garden soil, and at least twelve inches deep. Before transplanting, this dirt should be well forked over, making it fine and mellow, and then the surface rolled level.



SEATS FOR GARDENS AND LAWNS.

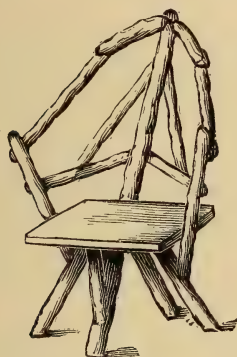
Use for Old Chairs.—Old kitchen chairs, which are too much used up for house use, may, with a little repairing, be made useful and ornamental for dooryard and garden purposes. Those chairs especially which have been carried off to the lumber room on account of becoming so unsightly from bruises and loss of paint, may be made to look pretty by giving them two or more good coats of bright green paint. You can buy a little box of prepared green at almost any store, and with a small brush and a little oil, all that is required is at hand.

The chairs will be very much improved after painting, by giving a coat of varnish. After using what paint is desired, pour linseed oil over that remaining in the can and keep it till wanted for use again. As green is a color which fades in the sun considerably, give the chairs a light dressing every spring.

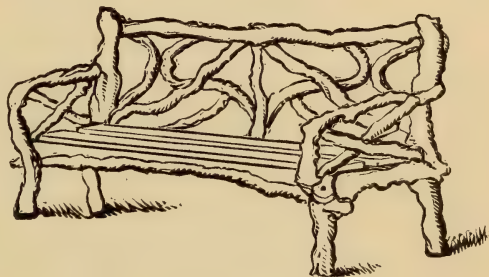
They will be found so handy beneath the shade trees and in the garden that no one will regret the little trouble required to fit them up.

Repairing Chairs.—Where cane seats or splint bottoms have given out, and it is not convenient to get them replaced, canvas may be used. Use a piece of canvas large enough to cover the opening, and go around the rods at the sides—if it was a splint bottom—then sew one side on firmly, then draw tightly (use a few tacks to hold it taut) and sew on the other sides. If it was a cane seat make the cloth, after it is hemmed, of sufficient size to reach on to the side rails half an inch or more, and tack on with brass, round headed nails if they can be had, if not use common carpet tacks. A seat of this kind will last a long time, and be comfortable to sit upon. Paint the canvas white for outdoor use.

To Clean Cane Seats.—Sometimes old cane seat chairs may be cleaned up for lawn use. Turn up the chair bottom, and with hot water and a sponge



RUSTIC CHAIR.



RUSTIC SETTEE.

wash the cane work so that it may be thoroughly soaked. Should it be very dirty, use a little soap. Let it dry in the air, and it will be as tight and firm as when new, provided the cane is not broken. Then the frames may be painted brown or green to suit the fancy.

Improving Chairs.—There has always been a great lack in the construction of chairs in making them comfortable. The backs are not of right shape, and the legs not of proper length. Common chairs may be considerably improved by shortening the hind legs a little. For average size male adults the front of the chair had better be sixteen to seventeen inches high; for grown, full size women, but fourteen to fifteen inches, and proportionately less for children.

Rustic Chairs.—Rustic seats should be made comfortable as well as ornamental. Frequently comfort is ignored for the sake of novelty, but the work is not commendable. Nothing is better for rustic chair making than the limbs of trees retaining the bark. All the tools necessary are a saw, hatchet,

inch auger and hammer. One of the most durable and comfortable styles will be found in patterning after the old-fashioned kitchen armchair, such as was used by our grandfathers. Make the seat of plank. The back, sides and arms may be made artistic by extra pieces of curved growth. Styles in which this work for outdoor use may be produced are almost endless, and suggestions in that direction will not be necessary further than the illustration, as any one can exercise his or her own fancy. Where the sticks used in rustic work are green, a liberal quantity of nails should be driven.

CONSTRUCTION OF CISTERNS.

Style of Cistern.—When making a cistern, the same rules as to doing the work in the best possible manner apply as when building a house. If expenditure cannot be afforded to make a large reservoir, without cheapening the work, make it small and perfect. There are, of course, some methods of construction cheaper than others, and the cheaper as good as the more expensive, so far as utility is concerned, the extra outlay being for surface appearance. Under no consideration would I consent to plaster a cistern on to the earth. There may be cases where they have stood well made in this way, but it is risky. Build up good brick walls, well cemented, and use a stone cap and then you have a certainty.

Excavating for Cistern.—When the size for the cistern has been determined upon, take a stick—a strip of board—and bore two holes through it as far apart as half the circumference of the place to be dug, then through these holes drive pins a few inches long, and use this as a sweep for marking the circle upon the surface. Dig down, making the sides as smooth and true as possible. If the cistern is to be jug shaped, begin to draw in when half the desired depth has been reached. A flat stone should be put in the bottom, if convenient to do so, with a basin dug out of the center; then the brick wall, commenced at the margin of the basin.

Bricks for a Cistern.—Do not use soft bricks. Sooner or later they will slack down from moisture absorbed from the soil, and make the cement on the water surface insecure. Use arch brick, at least those that are made from good clay and well baked. One can readily tell by the looks, or testing with a hammer, whether fit for use in a cistern or not.

Cement for Cisterns.—After laying the brick in good cement, the wall should be coated with plaster, made as follows: Clear, sharp sand, well screened, two parts, and water cement, one part. One peck of cement with two

pecks of sand is enough to mix at a time, as it will set, and works badly if wet too long before using.

Plastering on Dirt Walls.—Where the cistern is to be built without the use of bricks—this is not commendable—make the sides as smooth as you can, and commence to plaster the cistern by mixing, in an old tin pan, water and cement, to the consistency of milk. Hold this pan near the wall of the cistern, and with a shingle or something similar, dash this wash against the wall till it is completely wet. In a short time this will form a crust on the loose and sandy ground, so that common cement mortar may easily be put on in the ordinary way.

Measuring a Cistern.—There are many tables in use for measuring the capacity of cisterns, but the most simple is always the most desirable. A very good rule is to square the diameter and multiply that product by the decimal .7854, then this product by 1728—number of inches in a foot—and divide the product by the number of inches—231—in a gallon, and this will give you the capacity of the cistern in gallons to each foot in depth. Multiply by depth in feet to get the whole measure. If the diameter is not even feet, reduce to inches and omit multiplying by 1728; or, if the cistern has a slope, average the diameter.

Another rule is to square the diameter and multiply the product by the decimal fraction .1865, which will give you the contents, in barrels, one foot deep; multiply this by the number of feet the cistern is deep, and you have the contents of the cistern in barrels and fractions of barrels.

A more extended table is the following: For each foot of depth, the number of barrels answering to the different diameters, are as follows:

For 5 ft. in diameter.....	4.66 bbls.
6 “ “	6.71 “
7 “ “	9.13 “
8 “ “	11.93 “
9 “ “	15.10 “
10 “ “	18.65 “

Multiply any of the numbers given, corresponding to the diameter of your cistern, by the depth, and you have the number of barrels it will hold. The above table is for a circular cistern. If square, the following should be used:

5 feet by 5 holds.....	5.92
6 “ 6 “	8.54
7 “ 7 “	11.63
8 “ 8 “	15.19
9 “ 9 “	19.39
10 “ 10 “	23.74

Multiply by the depth as before.

Cistern Drain.—When walling up and plastering, the drain for surplus water should not be forgotten. At least a foot below the top a drain of brick should be put in and well cemented, if not tile, and if tile are used, they should be cemented at the connections, and a guard of wires placed at the further terminus to prevent mice and vermin going into the escape. Do not depend upon turning the spout off when the cistern is well filled, for the result will be an overflow during many a heavy night storm. The drain should never be less than the capacity of the eaves spout, and it is better to have it a little larger.

Cistern Covering.—The best top is a large flat stone with hole cut through having a cemented connection with the top bricks. Next to this two inch white oak plank.

Filtering Cisterns.—Pure soft water at the house is one of the greatest blessings that can be obtained. A few extra bricks and a little extra masonry are all that is required to make one of the cheapest and most durable filters in use.

There are various ways of constructing filtering cisterns, but I shall only give a few of the cheaper methods.

Brick Filter.—Build up a wall across the center of soft brick, cemented at the connections, the eaves spout going into one side and the pump in the other. Another way is to build up a square box or well twenty inches or so across for the pump to stand in. The water percolates through the soft bricks, which takes out all impurities and leaves it healthy and wholesome. Where the cross partition is used as the walls go up the mason should make the partition a little concaved, say sixteen inches in six feet. The convex side of this wall must be toward the side that receives the water, the concave toward the pump side. This gives it strength against sudden showers.

The end of the partition wall must be strongly worked into the side walls, and the whole carried up so high that the water will never overflow it. When finished, of course, this partition is not to be plastered on the surface, as the water filters directly through the body of the bricks. You will get a taste of brick for a few weeks, in the water, but if they are new and clean, this soon passes away and the work is done for a lifetime.

Charcoal Cistern Filter.—Build a partition wall across the cistern, having two-thirds on one side. Leave a number of holes through the bottom of the partition wall about four inches square; then plaster the wall with not less than two coats, both sides. Fill up the smallest side of the partition wall with charcoal; then fill up the other side about three feet with coarse sand. Let the water in on the charcoal; it will pass under the partition wall up through the sand and be as pure as a freestone spring. It will have no taste of rain water.

Cistern Screen.—It is an excellent plan to have the water as it comes from the roof go through a screen before reaching the cistern. In the fall of the year leaves are likely to lodge upon the roof and in the troughs and be

washed down. Make a box and place it at the mouth of the cistern, and cover the bottom with wire gauze. The box may hold about a pailful, and have a lid that may be easily opened to clean the screen. The conductor from the eaves to the cistern should also be so arranged that the water may be prevented from running into the cistern during the first part of the shower, especially after a long dry spell, till the roof is washed from smoke, dust, etc.

WELLS AND WATER.

To See Down a Well.—When the sun is shining brightly, by use of a piece of looking-glass one may discover a minute object in the bottom of a deep well. It is only necessary to throw a ray of light down by the reflective power of the mirror. The same may be used upon an open body of water, when the surface is unruffled, for the discovery of lost articles.

When the well is so situated that the reflection cannot be made to reach the perpendicular point, two mirrors can be used, or even three if necessary, although the power of light is somewhat lessened.

Foul Air in Wells.—No one should descend into a well until it has been ascertained whether or not there is foul air or “damps” existing. To make the test, lower a candle or lamp slowly down by setting the same in an empty pail. If the light continues to burn after the vessel has reached the water, there will be no danger to human life in descending; if, on the contrary, the light is extinguished, carbonic acid gas exists, and should be removed. A quick remedy is to force down in a tin or iron bucket a flame of burning straw or shavings. Another remedy is to sprinkle in fresh slaked lime either in powder or solution. A few quarts of lime, two to four, is said to be sufficient for an ordinary well, but if the well is to be cleaned, use it plentifully.

Influence of Iron on Water.—It is claimed that a few scraps of iron will prevent the bad odor from forming in water left to stand for days and weeks. The metal removes the free oxygen in the water, and prevents the decay of the organic matter that may be in the water. A better agent for rendering river water sweet and healthy, is to employ chloride of iron; a very small quantity suffices to throw down the organic matter, and thus to purify the water.

Test for Water.—Good water should be free from color, unpleasant odor and taste, and should quickly afford a lather with a small portion of soap. If half a pint of the water be placed in a perfectly clean, colorless, glass-stoppered bottle, a few grains of the best white lump sugar added, and the bottle freely exposed to the daylight in the window of a warm room, the liquid should not

become turbid, even after exposure for a week or ten days. If the water become turbid, it is open to the grave suspicion of contamination; but if it remain clear, it is almost certainly safe.

To Purify Water.—Cistern water becomes foul on account of a large amount of organic matter derived from the roof of the house. It may be in the form of germs, or may be vegetable or animal substances. This matter undergoes rapid decay and multiplication when the temperature is warm. There are two ways to correct the evil; one is by filtering, which, unless done on some improved plan, is not perfect, and the second by the addition of hypermanganate of potassa, used in the proportion of about an ounce to each fifty gallons of water.

A chemical change takes place, and the organic matter is reduced, and the whole mass precipitated as a harmless sediment. The chemical reaction is marked by a purple coloring, and this color indicates the presence of organic matter. The hypermanganate should be added until this coloring disappears. This preparation of potash may be obtained at any drug store. As an aid to keeping water pure, frequent agitation is commended.

Another Method.—A little dissolved alum is effective in clearing muddy water. If thrown into a tub of soap-suds, the soap, curdled, and accompanied by the muddy particles, sinks to the bottom, leaving the water clear and pure. In times of scarcity of water this may be used a second time for washing clothes.

A few minnow fishes put into a well is one of the best means of keeping the water pure, so far as worms and insects are concerned.

To Increase the Flow of Wells.—There is a simple way of increasing the flow of wells, devised some years ago by M. Donet, of Lyons, France. Ordinarily the mouths of wells are left open; hence, all along the water, from well to original source, there is an equilibrium of air pressure. M. Donet's plan is simply to close the well and pump out some of the air. This creates an excess of pressure to drive water into the well; the supply is thus increased temporarily, and at the same time the underground channels through which the water passes are enlarged by the stronger stream, and so the supply also becomes permanently augmented.

To Detect Hard Water.—To ascertain whether or not water be fit for domestic purposes, to a glassful of the water add a few drops of the solution of soap and alcohol. If the water be pure, it will continue limpid; if hard, white flakes will be formed.

To See Under Water.—When a body of water is frozen over, objects may be distinctly seen by cutting a hole through the ice, applying the face to the opening, and covering the head with a blanket. In the summer, a float with a hole curbed may be used with the blanket, and with the same effect. This may be used for the discovery of lost articles.

MANAGEMENT OF PUMPS.

Repairing Endless Chain.—When the tube of an endless chain pump has become so large that the buckets or carriers do not fill, take some light sole or heavy harness leather, and cut into circular washers large enough to fill the tubing; cut holes in the centers and slip them on the chain next above the carriers by taking the links apart, but do not use too many; four are enough, let the well be deep or shallow; not more than two should be in the tube at a time. Many, in repairing pumps with leather, put a washer to every bucket, and make the suction too great.

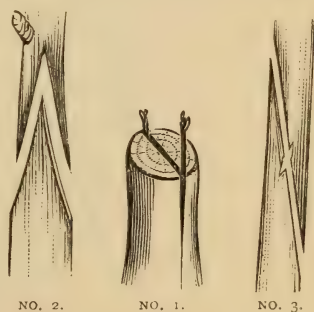
To Prevent Pumps from Freezing.—A cheap and effective way of preventing pumps from freezing in winter is to take flax tow or rye straw, and twist into ropes, two or three inches in diameter, and wrap around the pump, commencing at the bottom and pressing it down tightly until it reaches the top. By so doing, they can be kept from freezing in the coldest weather. Each part of the rope may be made about fifteen feet long.

GRAFTING AND BUDDING TREES AND VINES.

Cleft Grafting.—Grafting should be done as soon as the buds begin to start freely.

The common method of grafting in use is the cleft. The stock is cut off (No. 1) with a fine saw, and then split down the middle with a clean, sharp knife or chisel; the scion formed of the young wood of the previous year is then cut at the butt end in the shape of a wedge, and set in the gap. The gap is held open by a hardwood wedge until the scion is in proper position, and then gently withdrawn.

When the stock or branch is large, and more than one shoot is desirable, as in grafting old trees, two scions are inserted, as in illustration. It is necessary in grafting to bring the inner barks of the stock and scion together, for it is at this point the junction must be made to insure success, whatever may be the method adopted. If the stock or branch is small, it is often necessary to tie a string tightly around it to keep the scion in place. When this is done, cover with grafting wax or strips of cloth spread with grafting wax, to protect from the drying action of sun and wind.



Splice Grafting.—Splice grafting can be best performed when both scion and stock are of the same size. The simplest method is with a sharp knife to make a straight, sloping cut, as in No. 2; then cutting the scion to fit, a great amount of surface is thus brought into contact; but the tying requires to be carefully performed, so as to retain the scion in place.



NO. 4.

SPICE & SADDLE GRAFTING

A bud should, if possible, be left at the upper end of the cut part of the stock, and another at the lowest point of the scion. There are a number of modifications of this form, especially where the stock is larger than the scion. In the latter case, the inner bark of but one side of the stock and scion can be brought in contact. When tied, cover with wax.

Saddle Grafting.—Saddle grafting (No. 3) is a very good method, especially when the stock and scion are nearly of a size, for by this means a greater amount of surface is brought in contact than by any other. The stock should be cut into the shape of a wedge, the scion split and then cut out to match. Fit carefully, and there is little doubt that the graft will take. Tie and cover as in the other modes of grafting given heretofore.

One bud to a scion is usually enough; a greater number exhausts the sap faster than it can ascend.

In cut No. 4 is represented a combination of the two methods, saddle and splice grafting. A strong growth is obtained in this way, and the bulge that is made from cleft grafting is not likely to appear so prominently in this.

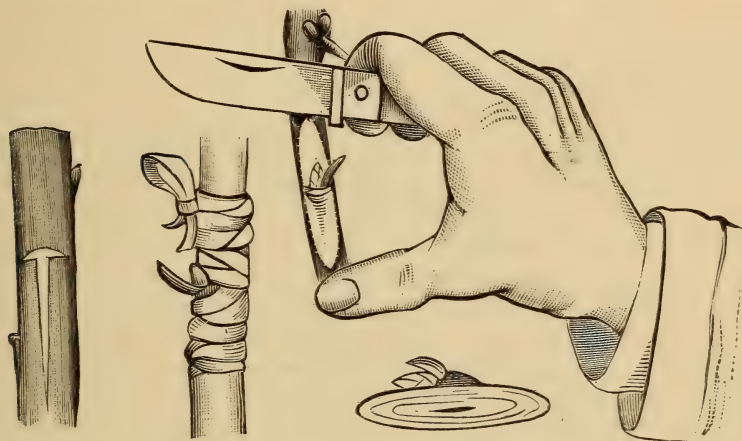
When to Bud.—The usual time for budding is from the first of July to the middle of August. But a more accurate rule is to be found in the state of the buds and the bark. The shoot from which the buds are taken must be of the current year's growth, and must be mature. This maturity will be shown by the forming of buds at the axils of the leaves, and of the terminal buds. The best buds for working will be found along the middle of the shoot.

Plums usually finish their growth earlier than other trees; hence, they should be budded earliest. Next come cherries, and then pears, etc. The bark must be in a condition to lift easily from the wood, and there must be sap enough between the two to feed the young bud, and to help form a union with it and the parent stock.

Do not prune at the time of budding or just before, as it has a tendency to check the growth; besides, the more your bud is shaded, the more likely it is to grow. Select cool and, if possible, cloudy or damp days to bud in. Late in the afternoon is a good time, or early in the morning.

Shield-Budding.—The practical operation of budding is simple. The method commonly followed in this country, called shield-budding, is as follows: Having cut a scion containing several good buds, choose a smooth young limb for the operation, and, if possible, let the insertion be made on the north side of the limb.

With a sharp, thin-bladed knife, cut a slit through the bark about an inch and a half long, and a cross cut at the top of it. Then from your scion slice out a good bud, leaving a little of the bark attached. Raise the bark of the stock,



SHIELD-BUDDING—CUTTING AND BINDING.

and slip the bud into the slit, and press it down to the bottom of it. Finish the work by tying down the bark and bud with soft string or woolen yarn, so as to exclude air and moisture from all, except the point of the bud. The illustration will give a good idea of the process.

Do the work quick, otherwise the bud will dry and be less likely to grow. A minute's time is long enough. Never neglect to loosen the bandages as they begin to cut; generally in a week or ten days will be soon enough. In some cases late in the season, they may remain for weeks, but I never approve of leaving them on all winter.

In selecting varieties, stick to the tried and approved sorts; let those who have more time and means do the experimenting.

Grafting the Cherry.—A fruit grower says that grafting the cherry is generally attended with far less success than the pear, apple and other kinds of fruit trees. The principal cause of failure is that they are not grafted early enough in the season. The young shoots used for scions are very sensitive, and will not withstand the least check after the buds begin to swell in the spring, which is generally before most other kinds of fruit trees; hence the neces-

sity of cutting the scions early in March and then put them away in the cellar, covering with damp moss or some similar material that will prevent shriveling, and keep them sufficiently cool to keep the buds from starting into growth. The operation should be performed in the usual method of cleft grafting, and as soon as severe freezing weather is past.

The scions should be inserted into branches of not more than one or two inches in diameter, and the greater number that are put into a large tree the more certain will it be to live and remain healthy. If all the top is cut away and only a few scions inserted, it is likely to check growth. It is a good plan to only graft one-half to two-thirds of the branches in one season, grafting the remaining portion the next.

Grape Vine Grafting.—It is very desirable, in many cases, to change the variety of grape vines in our gardens and vineyards, for the sake of testing new kinds, or improving the assortment, by adding one or more desirable varieties; and in some cases whole vineyards have been planted with varieties unsuited to the soil or location, and will have to be taken up or abandoned unless they can be changed by engrafting.

This operation was at one time regarded as too difficult and uncertain to be practically available, but experience proves that this need not be the case; and many amateur grape growers are assured that this desirable operation can be performed with almost as much ease and certainty as grafting an apple tree.

Time for Grape Grafting.—The season for doing this is any time during winter and early spring, when the frost is out of the ground, before the sap begins to move. In northern climates, where the ground is liable to remain frozen till spring is fairly begun, it is best to perform the work as late as can well be done in autumn, or during the "January thaw."

How to Graft Grape Vines.—Remove the earth around the stem of the vine down to the roots; saw it off about four inches above that spot, then split it square across as in top grafting orchard trees, and having cut the scions wedge-form, set them firmly into the cleft, one on each side if the stock is an inch or more in diameter, or but one if smaller, taking care that the bark of the scion fits evenly with the bark of the stock; then wind around tightly with cotton twine or other tying material which will rot off during the following summer and need no removing.

No wax or other covering is necessary, except to pack the soil firmly around the stump and scion, leaving only the bud at the top above the surface; then cover this bud with an inverted flower pot or something of the sort, to exclude the wet, and protect from winds, etc., surrounding it with a mound of earth, and covering the whole with litter, if done in autumn or winter, removing this covering as soon as the leaves begin to appear in spring.

Grape Scions.—The cuttings for scions should be taken off the vines in the fall or early in winter, and buried in sand or moss, if the grafting is de-

layed till spring. The scions should be four to five inches long, of good hard wood of last year's growth, not over large, and cut with a bud at the upper end—if very short jointed there may be two buds on a scion.

Soil for Grape Grafting.—If the soil where grafting is to be performed is clayey and wet, it is well to have a few shovelfuls of sandy soil for packing around the grafts; and if the position of the vines is low or flat so as to be exposed to standing water in times of heavy rain, it is better to cut off the stems above the surface, then bank up around the graft with a barrowful or two of soil, and cover well with litter if in winter.

Early Spring Grape Grafting.—In addition to my own experience, I have secured an article upon the subject of grape vine grafting from Geo. W. Campbell, of Ohio, a well and favorably known horticulturist. He says: "Much has been written and various have been the theories and modes of practice advocated by those who have from time to time enlightened the public upon this subject. During past years I have experimented pretty largely in nearly all the methods I have seen recommended; and though I have had some measure of success in most of them, I have invariably had the best results from grafting in early spring, at the time when the first indications of the moving sap could be discovered, and before the swelling of the buds or the great flow of sap had commenced.

"I have grafted in the fall; also during mild weather in winter; and also late in the spring, after the leaves had partially developed. I have sometimes also grafted successfully during the height of the great flow of sap, or bleeding of the vine, but have found none of those periods so favorable as that of the early spring, above indicated.

Size of Grape Scions.—"It is also very necessary to work quickly and accurately, using a very keen, thin-bladed knife, and fitting the graft to the stock with the most perfect precision. Healthy and well-ripened wood for the graft is also indispensable. The best size for general use is about that of a common lead pencil, though I have often successfully used wood not larger than a knitting needle.

Layer Grape Grafting.—"I have found it quite necessary that the graft should be below the ground; or, if this is impracticable, as near the ground as possible, afterward raising a mound of earth around the graft until a union is formed.

"A graft may be also inserted in the end of a branch which can be conveniently layered, burying the grafted portion beneath the surface.

Grafting Large Grape Stocks.—"In grafting large stocks, it is better to take out a small, thin wedge, beveled to the center and terminating in a point below; then cut the graft of the same form, a little thicker than the wedge removed, so that when inserted it shall fit as tightly and accurately as possible. A better fit may be obtained in large stocks if the cleft be opened a little by a

thin chisel or similar instrument, which, upon removal after the graft is set in place, allows the stock to close upon it with considerable force.

"A ligature of strong bass matting, or, in case this is not at hand, of flax or hemp twine, should be bound tightly about the stock, and the parts above the graft covered with clay about the consistency of soft putty. Then earth up to the bud upon the graft, and if there is danger of freezing weather, it is well to cover the whole graft with sand or light earth an inch or two above the bud.

"The accompanying drawing will perhaps afford a better understanding of the method of preparing the graft and stock, and if the above directions are carefully observed I am confident satisfactory results will follow.



GRAPE VINE GRAFTING.

Cross Grafting Grape Vines.—"I have found little difference in results whatever stock was used. I have grafted upon the wild grape of our forests, upon nearly all the older cultivated kinds, and have also, by way of experiment, worked the foreign varieties upon our natives, and the natives upon the foreign, with equal success. If any difference has occurred worthy of notice, it has been against the Clinton as a stock; for I have failed more frequently in my efforts to graft upon that variety than any other.

Shading Grape Grafts.—"Sometimes when grafts have been slow and weak in starting, I have found shading from the direct rays of the sun and occasional watering in dry weather beneficial."

Object of Grafting Wax.—The use of wax in grafting is to prevent the escape of sap, and prevent the exposed wood from drying up. There are very many different combinations of the materials used in making grafting-wax, in fact hardly any two operators use exactly the same combination. The chief object is to get a material that will work easily and at the same time withstand the high and low temperature of weather and resist water.

French Grafting Wax.—The French use a preparation applied with a brush while warm, made as follows: Resin one pound, Burgundy pitch one pound, beeswax ten oz., tallow eight oz., yellow ochre eight oz. Downing says the common wax of the French is made of pitch one pound, beeswax one pound, and cow-dung two pounds.

Liquid Grafting Wax.—A liquid wax for covering wounds when trimming, that will be a benefit especially when the cutting is severe, may be made as follows: One pound of resin, eight oz. of beeswax, eight oz. of tallow; add

to this five oz. of alcohol in which all the gum shellac has been dissolved that the liquor will cut ; then reduce the whole with alcohol until it is of proper thickness to be applied with a brush.

When but a few scions are to be set, it is not necessary to be to the trouble of making wax ; common clay mud may be used in its stead, and kept to its place by winding on tow.

Standard Grafting Wax.—One pound of resin, eight ounces beeswax, two ounces of tallow ; melt together over a slow fire, and when melted add a little linseed oil ; stir it in well, and pour the whole into a pail of cold water ; when cool enough work it with the hands. If it is found too hard, melt and add more tallow or oil, and if too soft put in more resin. When linseed oil is not to be had conveniently, use to one pound of resin, two ounces of beeswax and six ounces of tallow. Grease the hands when working the wax to prevent its sticking, and pull it until of uniform character.

Common Grafting Wax.—To four pounds resin, take two pounds beeswax, and one pound tallow ; melt together until the whole unites ; then pour the mixture into a bucket of water at blood heat. Oil the hands and work it until a pale yellow color, and make into fine sticks or lumps, and lay away. When used, place it in a small bucket of tepid water, when it will work easily, and never cracks.

Grafting Bandages.—Four parts of resin, three parts of beeswax, and three of lard, melted together, make a good wax. It takes much less wax, and is much handier to work with, and will make a better job to coat rags with wax. This can be done by tearing the rags into strips, from one and one-half to two inches wide, and dropping them into the mixture while cooking. It should be permitted to get cool enough before the rags are taken out, so that sufficient wax will stick to them to glaze nicely.

MANAGEMENT OF TREES.

Pruning Fruit Orchards.—Excessive pruning is as injurious to trees as neglect, and before the knife or saw is put among the limbs the top should be thoroughly examined to see if it would not be best to let it alone. If the branches are interwoven or so thick that the sun and air cannot have free access, there is work to be done. If two limbs cross in such a manner as to chafe each other, one of them should be taken off. When a large limb is to be removed, first cut the bark on the lower side with a sharp knife to prevent stripping down when the limb falls. Cut limbs off as close to the base as possible so as not to leave a stub,

The outside branches seldom require much pruning; the most of the work should be done in the center of the top. After an orchard is once properly trimmed it will require no more work upon it after that than can be done with a knife, if the job is attended to every spring.

Orchardists disagree as to the proper time for pruning, and probably always will, but so far as my individual experience is concerned I have always found the best results from pruning in the spring as soon as the trees become vigorous.

Replacing Orchard Trees.—When there are vacancies in old orchards to be filled with young trees, take a wagon to the spot where the tree has died and shovel out a load of dirt, removing all of the old roots, and then fill the place with good, fresh surface dirt from another field, and set out the young tree. This is the cheapest and quickest method of replacing. It takes many years for the roots of a dead apple tree to decay and the acid to leave the earth sufficient to warrant the growth of the second setting, and a young tree planted in the same soil where an old one has fallen, will not generally amount to anything.

To Save Girdled Trees.—It is said, upon good authority, that when a tree has been girdled during winter by mice or rabbits, it may be saved by cutting away the edges of the wound in the spring, till a fresh and healthy bark is seen. Then peel off strips from a limb of the tree, cutting them so as to fit the gap exactly, the ends of the strips pressing against the fresh edges of the bark. Confine by a bandage, and when circulation is active, the sap will pass through the bark thus grafted on, and the tree will grow as well as ever.

How to Set Out Trees.—A nurseryman says that if people planting orchards would give strict orders to mark the north side of the trees with chalk before taken up, and when set out to have them put into the ground with the north side to the north, in their natural position, a larger proportion would live and thrive. Ignoring this law of nature, he says, is one cause of so many transplanted trees dying. If the north side is set to the south, the heat of the sun is too great for that side of the tree to bear, and therefore the bark is killed and decay follows.

Healing Wounds on Trees.—Heat grafting wax, dip a strip of muslin in it, and place it perpendicularly over the wound while it is fresh; then put three or more narrow bands around the tree. This is sufficient, and the healing process will go on rapidly.

To Prevent Trees Splitting Down.—The best and most economical way to prevent forked trees from splitting, says the *Journal of Horticulture*, is to select two branches in a proper position and unite them by splice or tongue grafting. The large limbs should be secured together by a cord or other temporary bond, until the grafts have united. If the work is well done, the union will be perfect and will grow stronger every year. It is obvious that

the higher up this bond is placed the stronger it will be, as the leverage, of whatever force, such as the wind or their own weight, tending to separate the limbs will be less. Two or three such bonds might be formed, to provide for the failure of one.

In large old trees or those whose limbs have already begun to separate, the best thing is an iron bolt; and this should be fastened, not by rings around the limbs, which would soon girdle them, but should have a head on one end, and a nut to screw on to the other, the bolt being put through a hole bored in each limb. If the bolt is of sufficient size and the work well done, no fear need be entertained that the nut will give way.

But in this and in many other things, an ounce of prevention is worth a pound of cure, and the best way of all is to so train the tree while young that there shall be no forks which will be in danger of splitting open.

Paint for Tree Wounds.—I have found white lead and oil an excellent material to apply to the exposed wood surface where a large limb has been removed. The paint should be applied plentifully as soon as the cut is made. It prevents the loss of sap; it prevents the wood drying up and checking, and healing takes place rapidly.

Tree Labels.—When setting a young orchard, it is highly important to preserve the names of the trees, so that when they come into bearing one may be able to tell the fruit that each tree bears. The best and most durable label may be made of strips of zinc. Cut the pieces four to six inches long, half an inch wide at one end, and pointed at the other. Cut name of fruit with a pointed steel instrument in wide end, and bend pointed end once around a limb. As the tree to which it belongs expands by growth, the elastic strip of metal yields to the pressure.

Staking Young Trees.—Unless young trees are staked when set out, they will become lopped over by the winds, and the orchard made unsightly. One, or even two stakes, will not answer the entire purpose. One stake only holds the tree in one direction, and two stakes will not prevent chafing. Three stakes should be used, one set out at the east, one at the northwest, and the third southwest.

A very good way to stay the tree in place, is to make a belt of leather that will go loosely around the tree at a height to correspond with the length of the stakes. This belt should be about two inches wide and laced at the ends with leather string, so that it may be loosened if necessary. Scrap leather from harness or shoe shops will answer nicely for belts and lacing strings.

On three sides of the belt, to correspond with the three stakes, cut two slits half an inch apart and three-quarters of an inch long, and to these attach strong cords or leather strings to fasten to the stakes. The high winds will not move a tree thus protected.

Transplanting Large Trees.—Forest trees for shade and ornamental

purposes, that are very large, can be effectually transplanted by doing the work in cold weather. Dig about the tree to be removed at a time when the ground is wet and it has begun to freeze. Leave a large ball of earth about the roots, and this will soon become hardened by exposure to the frosty air. After digging well under the tree, with strong levers pry it out and roll it upon a sled or truck, and convey it to the place where it is to be set again. Take the unfrozen soil thrown from the hole dug to receive the tree, to pack around the roots after resetting.

If the soil is not as good where the tree is to be set as that from which it was taken, a wagon load of good material should be provided. Earth stored in barn or cellar for the purpose of winter transplanting will pay the extra trouble.

Staying up Reset Trees.—The tree after being set should be stayed by wires running from well up at the top to stakes in the ground, or by a ton or so of stone piled over the roots in a circle around the trunk. If the tree is tall the wires are more certain security against high winds.

SIMPLE USES FOR WIRE.

To Anneal Wire.—Every one should keep about the premises a coil of annealed or copper wire; it will come handy almost every day for mending breakages in implements and household commodities. A few cents' worth will supply a common family for a year, and often save many dollars. Wire may be annealed by simply heating until red or white, and allowing the wire to cool slowly.

Cheap Wire Bronzing.—Clean the wire perfectly, and then immerse it in a solution of sulphate of copper until covered with a coating of metallic copper. Then wash and immerse the wire in the following solution: Verdigris two ounces; sal-ammoniac one ounce; vinegar one pint; diluted with water until it tastes only slightly metallic, and then boil for a few minutes and filter. The wires are steeped in this liquor, at the boiling point, until the desired effect is produced; but do not keep them in too long. When taken out, wash carefully in hot water, and dry.

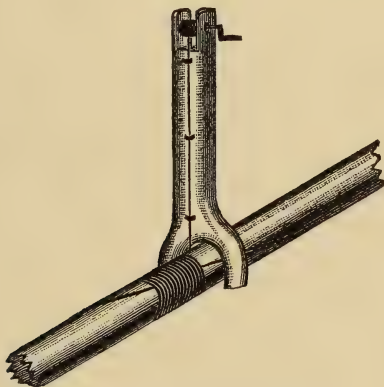
To Color Wire Black or Blue.—To color bright wire black or blue and perfectly smooth, the same as hair-pins, take of asphaltum, three ounces; boiled oil four quarts; burnt umber eight ounces; mix by heat, and thin with turpentine (oil) before the mixture becomes cool. Dip the wire in this (not too thick) and harden in a japanner's oven at as high a heat as it will bear without blistering.

Strength of Wire.—The following gives the relative strength of various metallic wires: A rod one-fourth inch in diameter, of the best steel, will sustain,

before breaking, 9,000 pounds ; soft steel, 7,000 pounds ; iron wire, 6,000 pounds ; inferior iron, 2,000 pounds ; cast-iron, 1,000 to 2,000 pounds ; copper wire, 3,000 pounds ; lead, 50 pounds ; milled lead, 200 pounds ; silver, 2,000 pounds ; gold, 2,500 pounds ; tin, 300 pounds ; cast-zinc, 160 pounds. Of course, the above are only estimates as to pounds sustained, based upon tests, but tests will vary greatly as the quality of the metals varies ; but relative strength is fairly illustrated.

To Remedy Kinked Wire.—To take the kinks out of soft wire, roll the rod between two smooth, hard boards. If the wire is large and hard, heavy pressure will be required between planks or iron plates. Part of the work may be done with the hammer before rolling.

To Wrap with Wire.—It is a difficult matter, by use of the hands alone, to bind a broken article sufficiently tight to make it answer the purpose intended. A good device has for some time been in use, which works effectually, and is so simple that any one can produce it, and with the use of but very few tools.



CHEAP AND HANDY WIRE BINDER.

The illustration will show how it is made. It need not be more than six inches long, one inch thick, and two inches wide at the top. Pieces are screwed on to the sides to support the reel, and a couple of little staples on the side to hold the wire in place.

Reel the wire on to the spool at the top, bring the end down through the staples and attach to the article to be bound ; then by the crank hold the wire taut, and move the whole thing around the article to be bound.

Another way to bind with wire, where an article is movable, is to have the second party hold the coil of wire with an improvised leverage, and put on the wrap by turning the stick to be bound, held at a strain, or, better still, by winding the wire upon a spool and then reeling it off with leverage.

MANAGEMENT OF BARRELS.

Painting Barrels.—Barrels to be used for storing liquids should be painted. Make the application when the wood is dry. White lead, with the addition of a little lampblack, to give it a blue cast, is a very good coating.

Hooping Barrels.—It is not necessary to take a barrel to a cooper to have hoops put on. Get some inch, or inch and a quarter hoop iron, a small steel punch—this may be made from a used up saw file—and a few small, short rivets. Punch a hole through the iron half an inch from one end, then bend the band around the barrel at a higher point than it is to be driven to, and mark through the rivet hole where the punch is to be used again. Punch the second hole, then cut off the iron half an inch from the puncture, and rivet the ends together. Hold the head of the rivet firmly upon some smooth, solid iron, like the head of an ax, and in pounding down the rivet work gently at first, until it is well spread out on every side, then flatten firmly. If the rivet fits the hole closely, it need not project more than an eighth of an inch before it is clinched down.

Cleansing Barrels.—To purify wooden vessels, use a solution of soda. An ordinary barrel should be half filled with water, and a solution of about two pounds of soda in as much water as will dissolve it; then head up the barrels and thoroughly mix the liquids by shaking the barrel, which should then be filled to the bung with water, and allowed to remain for twelve to fourteen days; then, after withdrawing the discolored liquid, it should be well rinsed and filled with pure water and allowed to remain several days, when it will be fit for use. Other wooden vessels may be treated with a solution of soda.

Another Method.—Scour the inside well out with water and sand, and afterward apply a quantity of charcoal dust. Another and better method is to rinse them with a pretty strong solution of oil of vitriol and water, which will entirely deprive them of their foulness.

Wine or Cider Barrels.—To prepare new oak barrels for wine or cider, use one pound of alum and four or five pounds of salt, to four bucketfuls of water; heat boiling hot, and put one bucket at a time in the barrel; rinse thoroughly; let it stand an hour, turn it out, and repeat the operation with another bucketful. Finally rinse with cold water and fumigate with sulphur, and it will be all right.

For Musty Barrels.—To relieve barrels from mustiness, burn a little sulphur in the empty cask bungs and let the barrels stand for a day or so.

Another Method.—Put in a liberal quantity of live coals and immediately fill up the cask with boiling water. After this, roll the cask once or twice a day for a week; then pour out the charcoal and water, wash out the cask with clean cold water and expose it to the external air for some days.

Charring Barrels.—In England, among some of the coopers, barrels are sweetened by what is termed “burning out” process. They take out the head, place the cask over a brisk fire, and char the inside completely. The head is then put in again, and the cask, before used, is filled two or three times with hot liquor, bunged down and well shaken before it is used again.

Shape of a Pork Barrel.—A rural gentleman writes me thus: “Formerly, I salted my pork in a bulging barrel (as I think most farmers now do), and found that when the meat got below the bulge of the barrel, it would float in the brine, and become what we call rusty, which made it very objectionable. I had a cask made straight staved, big at the bottom and small at the top, and since then I have not been troubled with rusty pork. It was made twenty-two years ago, and, save wanting a little hooping, is good yet. If pork is cut in strips, and packed edgewise and tight as packers do in such a cask, it will never float until the last ring is broken, and sometimes not till the last pieces are being used.

BOXES AND CRATES.

A Bulb Box.—An amateur can, without difficulty, make a box for bulbs that will be both inexpensive and ornamental. In the first place, procure or make a box of half inch stuff, twenty inches long, ten inches wide and seven inches deep. This size may be varied to suit the convenience, but the proportions are about right for symmetrical appearance. The box should be strong, that is, well nailed with one inch brads.

Bulb Box Ornamentation.—Secure some straight twigs and limbs with bark on, about as large as the little finger. The rods may be of willow if other material cannot be obtained. Split the rods in half by use of knife or fine saw, and tack them upon the box. First go around the edges, top and bottom, then up and down the corners, and then divide off into panels by tacking strips up and down. Five panels may be made of four inches each.

Fill each panel with strips close together, lessening in size until a two inch space only is left of the board surface.

Next take some thin wood (shingles will do) and cut out panels to fit the spaces, making them as smooth as possible with plane and sandpaper; fasten them in with brads; then after you are done nailing, have the box lined with zinc; when this is done, give the little panels four coats of white paint, and when the paint is dry take some pressed ferns and gay leaves, group them nicely and glue to the center of the panels; give all a coat of white varnish, and you will have a nice box.

Strawberry Boxes.—Home made boxes may be provided for marketing berries at little expense. For the side of the boxes have the material sawed three and one-eighth inches wide and one-fourth of an inch thick; for the ends three inches wide and one-fourth of an inch thick, and for the bottom four and three-fourths inches wide and one-eighth of an inch thick, and cut into lengths of five inches. The end pieces being but three inches wide and the sides three and one-eighth admits the bottoms to be nailed on or below the end pieces, but level with the sides, which project one-eighth of an inch below the end pieces, but bringing all on a level when the box is nailed together, and the boxes are five and one-half by five inches on the outside, and four and one-fourth inside or in the clear, measuring sixty-seven and a half cubic inches, and holding an honest dry measure quart which consists of 67.6 cubic inches. The wood of the white walnut or butternut is well adapted to making both crates and boxes, though hardly equal to basswood or willow.

Strawberry Crates.—Crates should be made holding thirty-six boxes in two tiers of eighteen boxes each, and others holding fifty-four boxes in three tiers of eighteen boxes each, having partitions in them for the boxes to rest upon.

Old Cigar Boxes.—Empty cigar boxes may be put to many uses. They are handy for storing scouring material in the pantry; for keeping nails, tacks, rivets, buttons, etc.; for storing the pipe-smoker's material; for storing garden seeds, making marten boxes, mouse traps, and when taken apart, the sides being of cedar, make good material for the bracket saw, and for panels upon which to paint small pictures.

GARDEN FIXTURES.

Garden Water Cask.—The profit of a garden depends upon the care bestowed upon it. Both vegetables and ornamental plants are frequently neglected, because it is a great deal of trouble to supply water, and more, perhaps, to apply it. A very nice and cheap device for watering can be constructed as follows:

Take a water-tight barrel and put it on a platform six feet or more high, and at the bottom of this affix a common faucet. Now procure rubber hose long enough for the purpose, and at one end of the hose have a fine spray nozzle that can be taken off or put on. At the other end have a burr with a thread cut to fit one that must be cut on the faucet. Now you are ready. Fill your vessel with water in the morning, and let it stand exposed to the sun all day. In the evening fasten on your hose, turn on the faucet, and water the plants.

Evening is the proper time to do the watering. Into this barrel you may put ammonia, iron, or any chemical that you desire, and when it is mixed with the water it may be applied without further trouble. Iron scraps may be left in the vessel all the time. The cost will be but a trifle, and it will repay in one season many times over.

Cheap Garden Rake.—A very light and useful garden rake may be made with but few cents' expense by any one, in the following manner: Take a stick of tough timber for the head, two feet long and about an inch and a quarter square. With a three-quarter auger bore a hole through the center for the handle; then with a proper sized bit bore holes once in two inches through the head and drive through twelve penny nails flatwise with the grain of wood, for the teeth.

The bit holes should be just large enough to make the nails go tight, but not so as to split the stick. By putting the rake head in a vise when driving in the teeth, the work may be done better.

If it should need bracing, put a three-quarter screw in each end of the head at the top, and drive only half way down, then one in top of handle twelve inches from head, and run a wire around from screw to screw, drawing tight, and fas-



HOME-MADE GARDEN RAKE.

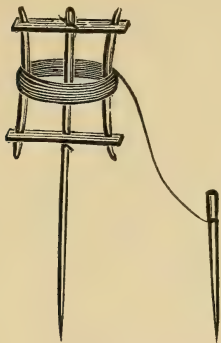
ten by winding. This will not add to the heft of the rake, comparatively speaking, and is much better in appearance than wooden braces nailed on. Such a rake will serve very well the place of a boughten one.

The Garden Line.—When laying out a garden, it is just as easy to have it symmetrical as otherwise, and no little gratification is afforded by the symmetry. To make the beds straight and of equal width, a liner must be used. One that will answer a very good purpose is made by the use of two sticks, a foot or so long, sharpened at one end, and the attachment of a line. The string at either end is to be tied to the two sticks, and then the line wound upon one of them near the top. To line a bed, stick the empty stake, and with the second in hand unwind until right point is reached, and stick that.

Another way is to have the line upon a spool after the manner of the carpenter's chalk line. Tie one end to a stake, after running out the line, stick a second stake with a split in the top, into which draw the taut line.

Cheap Garden Reel.—Make a frame, ten by twelve inches square from

two narrow and thin pieces of boards and round sticks. In the centers of the two pieces of boards bore holes with a three-quarter bit, and into these put a



CHEAP GARDEN REEL.

stick twenty inches or two feet long, pointed at one end. Put a pin through above and below the frame to keep the stick in place. The frame is to turn around upon this center piece, and should work easily. The illustration will give a good idea of its construction. Twine wound upon this may be reeled off at pleasure, and held at any point by use of a spring clothes-pin.

A Garden Marker.—A marker for beds may be made very easily, and one that will expedite work, as several lines, or seed furrows may be made at one stroke. Take a piece of wood two feet long and two inches square, and into the center put an old hoe handle, after the manner of a hand rake; bore a series of holes from the upper back to the lower front of the head; to these fit pins six inches long with blunt, rounded or diamond shaped ends. The teeth should be set slanting, so that as the instrument is drawn, the teeth follow with an end or side pressure. By having numerous holes in the head, the teeth may be set, or changed, as desired, for different plantings.



TO MAKE A BLACKBOARD.

Lumber and Size.—For the board secure thoroughly seasoned white-wood lumber, dress to an exact thickness, match and put together with glue. To key it up firmly, use the wooden clamp, as illustrated on page 20. When dry place in position. It of course can be made of any desired size. If not fitted between casings, a border of half or three-quarter stuff should be put around the board, projecting at the front half an inch or more.

If to be suspended, hang by a couple of leather straps screwed to the back. Use no nails or screws on the surface of the board. Sand paper the surface smooth before applying the blacking.

How to Paint the Board.—No oil should be used in the composition for covering the board. Wickerman's *School Economy* gives the following formula for making a paint, which is highly recommended:

"To make one gallon of paint, take ten ounces pulverized pumice stone, six ounces pulverized rotten stone, three-fourths of a pound of lampblack, and mix with alcohol enough to make a thick paste. Grind the mixture thoroughly, and

then dissolve fourteen ounces of shellac in the remainder of the gallon of alcohol. Stir the whole together, and the paint is ready for use."

Another Formula.—Take one gallon of pure alcohol and put one and a half pounds unbleached gum shellac in it and let it stand twenty-four hours, or until it is thoroughly cut; then take two gallons of alcohol and put in one pound of lampblack and one pound of flour of emery. Mix them thoroughly.

Now take the alcohol and shellac and mix it with the alcohol, lampblack and emery; mix them thoroughly and shake or stir often while applying. The paint should be of the consistency of thin varnish; if too thin thicken with lampblack, if too thick thin with alcohol, and apply with any fine paint brush, the larger the better; a flat brush is the best. In making smaller quantities, use same proportions.

Paint for Old Boards.—Dissolve gum shellac in alcohol, and mix it with lampblack and flour of emery. No more lampblack or flour of emery should be used than is necessary to give the required black and abrading surface; and sufficient gum to hold the materials together and confine the composition to the board. The thinner the mixture the better. The lampblack should first be ground with a small quantity of alcohol to free it from lumps. Apply with a common painter's brush, and when dry, smooth with pumice stone.

An Economical Paint.—For fifty square feet of board, take four ounces of common glue, three ounces of flour of emery, and just lampblack enough to give an inky color to the preparation; dissolve the glue in one-third of a quart of warm water, put in the lampblack and emery, and stir until there are no lumps, then apply to the board with a woolen rag smoothly rolled. Put on two or three coats evenly, and you have a nice surface at a cost of about thirty cents for material.

For Blackening Walls.—If a plastered wall is to be blackened for a "board," sand-paper the whitewash off so that the shellac may adhere to the wall. If there are any holes in the plastering, fill them with plaster Paris, and work down the whole surface smoothly. When making a wall on purpose for a blackboard, a wall of sheeting should be placed half an inch back of the lath, so that the plaster will form a solid bed. For coating the plastered wall use the second formula given, and apply a sufficient number of coats to make a good, black surface,

To Make Black Plaster.—Wickerman says that a cheap, serviceable plaster may be made by using one bushel each of white coating or finishing-coat material, fine, sharp sand, ground plaster, with four gallons of alcohol, and four pounds of lampblack. Whisky will answer the place of the alcohol.

This quantity, it is claimed, will make a mixture sufficient to cover twenty square yards. A little flour of emery will prevent the mixture from "setting" immediately, thus giving time to put it on the wall with necessary care; if emery be not used, only a small quantity of the mixture can be put

on at a time ; and this is, perhaps, the better way. The wall which is intended to be covered with the black surface, should be plastered like the rest of the room, with the exception that the black mixture takes the place of the white coating, and is put on in the same manner ; after the black surface is on the wall, it must be carefully dampened and rubbed, in order to fill up the pores and make the surface hard and smooth. If the old surface be well moistened, a new surface, composed of the same mixture, may be applied. It must be remembered that the black surface requires much more working with the smoothing trowel than the white finish.

FILTERS AND FILTERING.

A Good Water Filter.—Take an oak cask or barrel that is sound, sweet and clean ; bore an inch hole near the bottom of one side, in which insert the end of a piece of three-quarter inch lead pipe (from inside), ten or twelve inches long, the other end projecting inward and bent upward toward the middle of the cask. In the lower end place a common beer faucet or stop cock, from which to draw water as desired.

Have ready say one bushel of good hard wood charcoal, and the same quantity of clean, fine gravel—not limestone—from the fineness of coarse sand, up to the size of peas, and if not clean, wash it till no dirt will appear in the water.

Break the charcoal to the size of walnuts and smaller, then mix it evenly with the gravel. Cover the bottom of the cask three or four inches thick with this mixture, pounding it down firmly. Next take a clean tin vessel, the shape of a garden flower-pot, of large size (say two gallons), and place it bottom upward in the center of the barrel, on top of the layer of gravel and coal, and over the end of the lead pipe. Then take a piece of small sized one-quarter or three-eighth inch lead or wood pipe, and place one end firmly into a hole in the bottom of the vessel, and bring the other end through a hole bored near the top of the barrel, for the purpose of admitting air into the space under the pail. Now fill in the space around and above the tin vessel with the mixture of coal and gravel, pounding it firmly down as you proceed, till the cask is about three-fourths full ; then place some thin flat stones (not *limestones*) on top, and the filter is complete.

The water being poured in on top, passes through the gravel and charcoal, by which it is purified, and enters the chamber from which it is drawn by the faucet, as required, the small pipe admitting air into the chamber to supply the place of the water while it is being drawn out.

This filter is only designed for rain or soft water, and will serve for constant

use a year or more without renewal ; but if used for hard water, the charcoal soon loses its virtue. When first put up, the water drawn from the filter will have an alkaline taste, but that disappears after the filter has been in operation a day or two.

Poor Man's Filter.—Take a common garden flower-pot, of some nine inches diameter and ten inches depth. The drainage hole is stopped (not too tightly) with a piece of clean sponge. A layer of about two inches of charcoal is first placed in the pot ; then a second layer of clean sand, upon which a layer of three inches of clean, coarse gravel is placed. The pot can be set over an earthen jar, into which an abundance of pure drinking water will filter for all drinking purposes.

Another Method.—Place on a slat bottom in a clean pail, not painted inside, and having a hole in the bottom, a piece of flannel, and on this some coarsely powdered charcoal, then coarse river sand, and cover the whole with sandstone broken into small pieces. The pail should rest upon a little platform, projecting enough to clear the hole for water escape from the platform, and keep a one or two gallon jar beneath it. In summer, by keeping a piece of ice in the crock or jar, a refreshing drink is ever ready. I have used this with entire satisfaction.

Paper Filter.—A very cheap and quickly constructed filter for liquid, remedies, etc., especially those cut in alcoholic fluids, may be made by taking a square piece of blotting paper and folding it both ways, corner to corner through the center. By thus folding it is made cupping when opened, and will sink into the mouth of a small vessel sufficiently to contain an ounce or so of the substance to be filtered. It is better, however, to use it in a funnel.

Regular filter paper can be purchased at almost any drug store, very cheap. This comes usually in round sheets, but for use it should be cross-folded the same as the square. If these paper filters were used more, there would not be so many ill effects from poisonous sediments in medicines.

To Filter Wine.—In some cases where the wine is only a little thick from mechanically suspended substance, it can be made quite clear by filtering through a wad of white cotton put in the funnel ; and when this answers, it is much quicker than the paper filter.

Filter for Oil and Jelly.—For jelly and oil, wool alone is the proper medium for filtering. The felted wool jelly bag is pretty well known as the best means of clearing calves' foot jelly, and it also answers for olive and other oil. These bags are, however, too expensive to be generally used ; hence they are rarely seen in kitchens.

A good substitute for the wool bag is a colander, on the inside of which a new flannel lining should be fitted, made of double stuff. A wad of white knitting wool, thoroughly cleansed, put in the neck of a funnel, will do to filter any small portion of such fluids.

MECHANICAL USES OF OILS.

Castor Oil for Belts.—No vegetable oil will equal this for use upon leather, and no animal oil is superior in many cases. Leather belts for transmitting motion in machinery, will usually last from three to five years, according to the wear and tear they are exposed to; when greased with castor oil, they will last much longer, as they always remain flexible and do not crack.

Beside this advantage, castor oil will prevent slipping, so that a belt three inches wide, impregnated with it, it is said, will be equal to a belt four and a half inches wide without castor oil. It is necessary, however, to wait twenty-four hours, until the oil has disappeared from the surface and penetrated the leather, otherwise the freshly greased surface will cause slipping.

Rats and other vermin detest anything impregnated with castor oil, and will not touch it—another advantage, and one of considerable importance, especially when belting is to be stored for a time.

To Refine Neatsfoot Oil.—Put, say a quart of the oil with half a pound of bright lead shavings, and half a pound of quicklime pounded, into a glass bottle; let it stand in the sun and light for two or three weeks; then put the oil and lime into a saucepan, with half a pound of washing soda; boil gently fifteen minutes; then set in the coldest place possible till the next day, when it will be found congealed; then put into a filter of white blotting paper, place a clean glass bottle under the filter, and you will get some of the finest oil, suitable for the most delicate machinery.

Any one requiring a little nice oil, would do well to try this in preference to buying it ready prepared. It must be kept perfectly cold while filtering, or the soda will go through into the oil.

Raw vs. Boiled Oil.—Many have an opinion that linseed oil is not fit for use unless boiled, and no greater mistake could occur. Boiled oil is less penetrating than raw, therefore is not as durable when exposed to the influences of sun, wind and storms.

Boiled linseed oil is very good for inside work, as it does not have to withstand the trying influences of the weather. It dries quicker than raw oil, and hence its popularity; but I would advise, after an experience of many years, not to use boiled oil either upon the outer surface of buildings, fences or vehicles. The drying of the paint mixed with prepared oil is not owing to penetration, but to atmospheric absorption, and it is left less adhesive than raw oil paint and more liable to crack.

Cheap Machine Oil.—Take one quart of sperm oil, one gill of refined coal oil, and mix thoroughly by shaking. This mixture answers a very good purpose for machinery, as it does not gum up. Another method is to put some zinc and lead shavings, equal parts, into good olive oil, and place the same

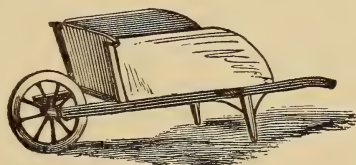
in a cool place until the oil becomes colorless. No definite amount of the metals is required.

How to Test Olive Oil.—When it is desired only to ascertain whether the oil is pure or not, without precise reference to the nature of the oils used in adulteration, take equal quantities of olive oil known to be pure and the oil to be tested; place the samples in separate test tubes into which a good thermometer may also be inserted, and heat each separately to a high temperature. The pure oil will become somewhat paled during the heating, while the adulterant oils will give off an offensive odor.

Oil for Whetstones.—Good sweet or olive oil is commonly used upon whetstones. In testing a new stone, try water first; if it glazes, oil is required, and almost all stones, unless oiled, become glazed or burnished on the surface, so that they no longer abrade the metal. Most stones, after being oiled, give a finer edge than they do in a dry or merely wet state. The pores of the stone become in a measure filled up, and while the action is rendered continuous, its character is altered. A dry stone is very apt to give a wire edge to a tool, and although this sometimes happens when oil is used, yet it does not occur nearly so often. Some stones, however, work better with water than with oil. Therefore the test should be made before the oil is used. If it cuts without glazing, do not apply oil at all.

THE WHEELBARROW.

Adjustable Side Wheelbarrow.—No wheelbarrow for general use about the premises is so handy as the common one with adjustable sides, made as represented in the accompanying small engraving. One who is not a professional mechanic, had better buy than attempt to make one of these. The wheel is a difficult thing to construct.



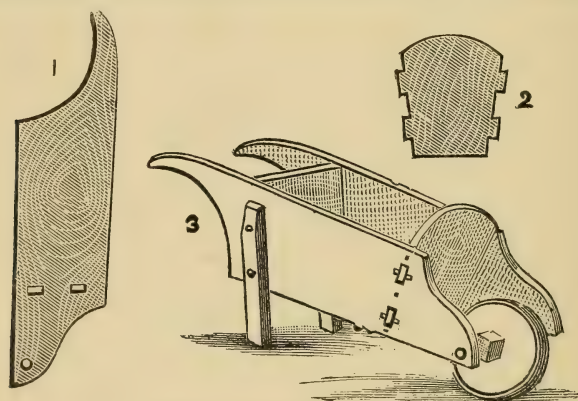
ADJUSTABLE SIDE WHEELBARROW.

Plank Wheelbarrow.—A hand vehicle may be made of planks that will answer a very good purpose, but it is not a thing of beauty. In an English work, by S. T. Aveling, I find a very simple plank wheelbarrow, the substance of which is subjoined:

Wheelbarrow Box.—Procure a board twelve inches wide and fully an inch thick, and with a piece of chalk mark out the parts according to the diagram, Figs. 1, 2, 3, in the following illustration :

First cut off the two sides of the barrow, which should measure from the extreme tip about fifty inches, and twelve inches wide, Fig. 1. Then cut off the tail-board, which should also be twelve inches deep, eighteen inches wide at the bottom, and at top twenty inches. For the head or front-board a piece of wood of the same thickness, eleven inches deep ; the slope of this will take up an inch, and the round top an inch, which takes up the two inches, and brings the front-board to its proper depth.

This board must be cut no wider than the tail-board, and the taper to barrow given by two inch tenons on each side. Next comes the bottom ; this should be of three-fourth inch stuff, eighteen inches wide and two feet long.



HOME-MADE PLANK WHEELBARROW.

To Make the Wheel.—For the wheel, a piece of one and one-half inch elm plank is the best. Upon this, with a pair of compasses, strike out a circle nineteen inches in diameter, and in the center, a one and one-half inch circle for the hole to receive the axle ; cut this square with the chisel to fit the axle. For the stock or axle of the wheel, get a piece of one and one-half inch square oak or ash, and for the legs a piece of ash about one and one-half inch wide and one inch thick, forty inches long ; bevel the latter off at each end, from the flat side to about four inches down, cut it into two twenty-inch pieces, and these form the legs.

To Frame a Wheelbarrow.—Take the sides, and gauge from the top edge one and one-fourth inches and two and one-half inches down, two parallel lines, and two more seven inches and eight and one-fourth inches down. These form the upper and lower mortise, one and a fourth inches deep, and they should be the width of the head-board, viz.: three-quarters or an inch wide. These should be cut out with a mortise chisel.

The head-board should be tenoned to suit the mortice holes of the side-board, as shown in Fig. 2. After this, fit the head-board to each side-piece, and mark or scribe the pin-holes. Then separate them again, and bore these pin-holes with a gimlet a quarter of an inch in diameter.

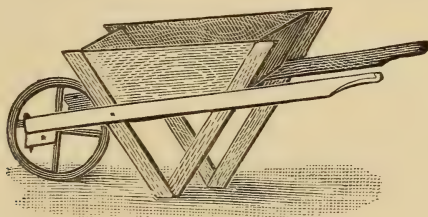
The wheel must next be finished, as it must be put in the barrow when the frame is fitted. Square and taper, from nearly the center to the ends, the one and one-half inch piece of oak or ash before mentioned; the ends should be rounded and be about an inch and a quarter in diameter.

To Fit the Wheel.—From the blacksmith's procure two iron ferrules, to fit on to the ends of the stock or axle (to prevent the wood splitting), and two gudgeons of three-eighth inch round iron, three inches long, and sharp square-pointed to one end, to drive into the end of the stock.

Bore holes to receive them with a gimlet of the right size, and drive them in tight, after putting on the ferrules.

The ferrules are generally made slightly tapered or conical, and exactly the size of the end of the stock upon which they are placed. By putting the ferrules into the fire and making them hot, they will be considerably expanded by the heat, and will easily fit on the wood, which they could not do when cold.

After driving them fairly on, plunge them into cold water, and the rapid contraction of the iron caused by the change of temperature, will make them fit quite tight. The wheel is now complete.



THE SCANTLING WHEELBARROW.

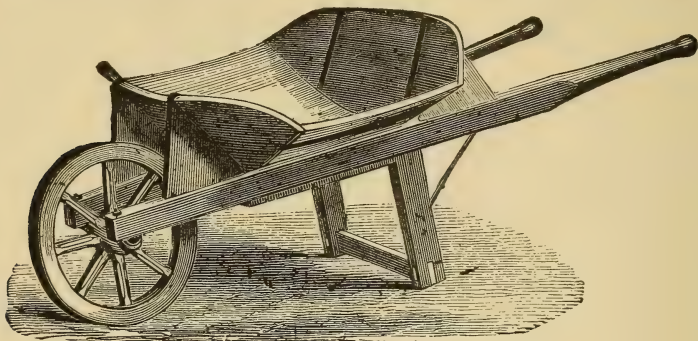
In the side-pieces bore with an auger a three-eighth inch hole, to receive the gudgeons of the wheel. Place the wheel between the two sides, refit the front and back piece, and drive in the four pins through the tenons of the front, and secure the back-piece with four two inch cut clasp nails. Now fit the bottom of the barrow *inside* the frame, and nail it with one and one-half inch cut clasps.

Finishing Up.—The legs should be screwed on with two strong screws in each leg. To make it easier of construction, the side-board need not be framed to the head-board, but screwed up firmly to a flat surface. Round the handle end of the side-boards, so that the hand may grasp them easily.

A Scantling Wheelbarrow.—Another English publication gives the following cheap style of a wheelbarrow, which is almost entirely made of scant-

ling. It has no particular advantages, and is not very attractive in appearance. Its cheapness is its prominent feature.

Dumping Wheelbarrow.—The plank construction before given has no advantage over the common dumping wheelbarrow, made strong for hard



THE DUMPING WHEELBARROW.

usage. This may also be made with a plank wheel, or the wheel purchased and the rest made at home. If one prefers putting on the end pieces supported by beveling planks, the bottom may be put in by bending an elm board and staying it with irons. Dimensions to suit the fancy.

MANAGEMENT OF CARRIAGES.

Damage from Mud.—The owner of a nice carriage has, or should have at least, a pride in keeping it looking well, and it is therefore essential for him to know what kind of usage is most hurtful, and how to best guard against damaging influences.

Mud is the greatest enemy to varnish with which the carriage comes in contact, if the substance is allowed to dry on, as it appears to sap out or deaden the luster, and at the same time destroy in part the body life of the coating. To prevent bad effects from mud, the vehicle should be washed as soon as it comes from the miry street.

How to Wash a Carriage.—In washing, particular caution should be exercised against using a broom, brush, cloth, or even the hand to rub off the mud, for the grit will scratch the surface of the varnish and mar the luster. Water should be dashed on if hose are not at hand. Use water plentifully before applying cloth or sponge. Where the mud has been allowed to dry on, wet it thoroughly; let it remain until soaked up soft, then dash on water until the dirt disappears. Apply the sponge carefully at first, well saturated with water.

If it can be avoided, mud should not be allowed to dry on. In winter, do not use hot water. It will destroy the varnish luster.

Where to Keep a Carriage.—The durability of a carriage depends very materially upon the place in which it is kept. A damp house is injurious to both leather and varnish, and men very often, who keep their vehicles in such a place, make complaints against the carriage makers for not using better materials for coating and coverings.

The house should be dry and clean and separate from the horse stable, for no varnish will stand the action of ammonia arising from horse-stalls. The alkali coming in contact with the oily portions of the varnish dissolves the surface, or rather makes it brittle, so that when it is used in mud, or washed, it crumbles away. No varnish was ever made that will stand the ammonia arising in a stable where horses are kept.

Loose Bolts.—Loose bolts allow the wearing away of the parts they are designed to hold together firmly, and it is a matter of economy and of safety besides, to always keep a wrench in the vehicle and to tighten up a bolt as soon as it becomes at all loosened. A good rule to adopt is to go over the carriage once in a while and see that all the nuts are drawn up in place; where a bolt is defective, take it out and put in its place one that is perfect.

Carriage Injured by Sun.—A carriage is injured more by standing still in the hot sunshine than by use. When in motion a strong and cooling current of atmosphere circulates around it, and the rays of the sun do not pour constantly upon one portion of the wheel.

Top carriages should never stand with the top down, and aprons of every kind should be frequently unfolded, or they will soon spoil.

Care of Carriage Tops.—In the management of the cloth or leather part, *i. e.*, the top, there is the same necessity of keeping the part clean that there is in keeping mud from drying upon varnish, for mud will injure the luster of oilcloth and besides rot the material. To renew the top, wash it clean and rub with a cloth until perfectly dry, and then go over with second cloth, using a little sweet oil; this will revive the brightness of the material, which absorbs the oil sufficiently to prevent the trouble that would follow oiling varnished work.

Carriage Top Dressing.—The following preparation has been highly recommended for carriage tops, but I have never tried it: Take of ivory and lampblack each one pound, indigo one ounce, gum arabic four ounces, brown sugar six ounces, glue half an ounce; dissolve in two pints of hot water, and mix the whole well together. If you wish it thinner, add half an ounce of spirits of wine.

Cleaning Glasses of Carriages.—The glasses of the carriage may be cleaned in the ordinary way of washing and rubbing with Spanish whiting, using common print paper for rubbing. It is better to take the lights out where it can conveniently be done.

We have seen recommended the use of strong potash solution on paper for rubbing away spots, but have never tried that material. The only objection to the potash is that it is likely to injure the cloth on the frame if it comes in contact with it.

A paste for the same purpose is made of tripoli dissolved in brandy; apply this with a rag, being careful to cover the glass; after it is thoroughly dry rub it off with chamois or cloth. If the frames are covered with black cloth, add a little ivory black to the paste and it will not spot the cloth.

Coal Oil for Carriages.—Oiling the parts where friction is caused by iron coming to iron is another matter worthy of attention, for a vehicle can be very much injured by an injudicious use of lubricating material, where the wheels are made upon wooden hubs. On the fifth wheel, or circle, and other places of friction, outside the hubs, coal oil is good, and coming largely into use. It has an advantage in not drying or gumming up. These parts should not be neglected. Dry irons rubbing together wear away rapidly.

Oil for Carriage Wheels.—On the spindles of the axle-tree nothing is better than castor oil, and but little of this should be used, as the spindles fit so perfectly into the boxes that but little space is left for retaining the lubricator, and consequently the excess must work out.

After removing the wheel, wipe off the spindle with a cloth dampened in coal oil or spirits of turpentine, then apply the castor oil by running a little line of the material from the bottle down the center of the spindle.

Put on the wheel with an upward pressure so as to leave all the space there is between the box and spindle for the oil, and prevent forcing it out. Never use lard upon any wheel with wood hub, as it will penetrate and follow the pores of the timber, and have a tendency to loosen the spokes.

Resetting Carriage Tire.—It will not pay to reset thin wheel tires. The chief strength of the wheel lies in the rim. When the tire requires resetting, take the vehicle to a regular carriage shop and leave a particular caution that the wheels must not be cramped. Not one common blacksmith in ten who does not follow carriage ironing, can set the tires on four wheels and keep them uniform. There are certain principles and rules to be observed in tire setting that if not fully understood and observed will result in absolute damage.

Mats for Carriages.—It is not a good plan to have oilcloth tacked over the bottom of a carriage, for the reason that when the vehicle is wet, moisture will remain beneath the cloth and rot the bottom of the carriage. Some sort of mat is much more preferable, so far as appearance goes, and more profitable, because it can be taken out and the bottom boards allowed to dry after getting wet. The bottom should also be thoroughly painted as a protection.

Painting Carriages.—For how to paint a carriage, see Painting Wagons. The same rules as to application of material will apply here. One thing, however, should be strictly borne in mind, never attempt to paint a car-

riage if crowded for time. Where two or more coats are applied, each should have plenty of time to dry before a succeeding coat of paint or dressing of varnish is put on. If the under coat is not well hardened, the process of evaporation will burst the outer coat, and the result will be, cracked paint. It is also important to use good material. Where gum shellac forms a part, it is liable to crack, for the reason that that substance swells in dissolving, and contracts in drying.

Rattling Carriages.—Do not allow your carriages to rattle like a threshing machine, but as fast as nuts or bolts get loose, fix them. Washers of sole-leather on the spindles of the axle-trees will stop the clatter caused by too much “play.” A piece of rubber put in between the thill iron and clip will silence matters there; and a little coal oil on the circle, or fifth wheel, will stop squeaking. Where nuts work loose, cut a thread in front of them with a cold chisel, after screwing them up tight. A monkey wrench should be carried, that the nuts of different sizes may be attended to. It is as necessary to look over a carriage before going out to ride in it, as the sounding of wheels on a railroad train. A great number of lives have been lost, and thousands of dollars in runaways, caused by the sudden giving out of some part of a vehicle. A bolt, perhaps, has long rattled its signal of death, and been entirely unheeded.

Carriage Covering.—To keep the carriage free from barn-dust, use a cover upon it. This is best made of enameled cloth, but any cloth will do. It can be made like an open sack, to be drawn over, or large and square, so as to hang over ends and sides.

Using Sponges on Carriages.—These should be kept in good supply, and if convenient, add chamois. Where neither are at hand, use old cotton rags. Sponges and chamois are much better. Never use upon the body of the carriage the rag or sponge that has been applied to the hub, or about the irons where grease is used.

Varnishing Carriages.—Never use oil to brighten varnish, as many recommend, for if either animal or vegetable, it will leave a gummy surface, which will catch and hold fine particles of dirt, and make the carriage look worse after a short time than before the oil was applied; and further than this, it puts the surface in a bad condition for applying varnish when it is found to be necessary, or even for repainting.

The correct plan to adopt, is to use the carriage as it should be used until the luster is gone, and then take it to a reliable shop and have it properly coated with good material.

If varnished at home, as it may be, very nicely, after a little practical experience, do not use cheap material, for it is mistaken economy; while the difference in the cost of sufficient varnish to coat a vehicle is but a few cents, the profits from looks and wear in favor of the better, amount to dollars. As to how to prepare and apply varnish, see chapter under head of Varnish and Varnishing.

MANAGEMENT OF THE HARNESS.

Mud on Harness.—Mud is more destructive to leather than moderate wear, and so one of the chief things to be observed in the care of harness is to keep it clean and the pores filled with proper ingredients to increase the pliability, and at the same time render the leather impervious to water.

How to Wash a Harness.—One thing to remember in cleaning a carriage is that the mud which has accumulated is not to be taken off by rubbing; if it is dry (and it should never be allowed to become so if it is possible to prevent it), soak it well and let it get soft, so that by throwing on water it will run off.

When harness is to receive a thorough dressing unbuckle every strap and wash clean with warm soft water, in which there is a little castile soap, using a sponge or cloth, and when nearly dry apply the oil.

Oil for a Harness.—Vegetable oils, with the exception of castor oil, should not be applied to the harness, as they are hardening in their effects. Neatsfoot oil is perhaps one of the very best leather protectives that can be used. Before applying it is necessary that the leather be slightly dampened, so that the oil will penetrate. I have used with good effect one quart neatsfoot oil, four ounces beef's tallow and three tablespoonfuls of lampblack; add four ounces beeswax for use in summer weather, if you choose.

How to Oil a Harness.—There are two ways of making the application of oil. One is to rub with a woolen cloth, saturated with oil, every part of the harness, save those of patent leather; another way is to put two or three quarts of neatsfoot oil in a long, shallow pan, and draw each piece of leather through it slowly, bending the leather backward and forward, and rubbing the oil in with a cloth or sponge. In either case be careful that where the buckle holes are, a little more is applied; also the bellybands, breechings and the straps that buckle in the bits, need an extra allowance. On an old harness that is very dry, dress with castor oil before washing; this will prevent penetration of water, which resists oil.

Management After Oiling.—After oiling, the harness should not be exposed to high temperature of heat, either in a room or by exposure to the direct rays of the sun. In summer time let it hang in the barn, in winter in a moderately warm room, until the oil has well penetrated. Rub off with a dry woolen rag all the oil that remains on the surface, if any, after drying.

To Clean the Plating.—In cleaning the plating, rotten stone or whiting may be used, but generally an occasional rubbing off with a woolen cloth will be all that is necessary.

Dressing Patent Leather Parts.—The patent leather parts of a harness, such as blinders, saddle, etc., should be rubbed over with sweet oil, and

immediately wiped off with a soft woollen rag or chamois leather; this is all the care those parts need.

Keeping a Harness Nice.—Whenever the harness comes from the street bespattered with mud, wipe it clean with a damp cloth, and then hang up each part so that it keeps a natural position. With good care a well made harness will last twenty years.

Grain Black for Harness.—When harness loses its luster and turns brown, which almost any leather will do after long exposure to the air, the harness should be given a new coat of grain black. Before using this grain black, the grain surface should be thoroughly washed with potash water until all the grease is killed, and after the application of the grain black, oil and tallow should be applied to the surface. This will not only “fasten the color,” but make the leather flexible. After the harness has had a good oiling, an occasional rubbing with tallow and lampblack will keep the leather tough and pliable, and prevent it from cracking.

To Make Harness Look New.—To give the leather a characteristic color of new, add to one pint of oil a large tablespoonful of lampblack and an ounce or two of beeswax. Leather varnishes are not to be recommended, as most of them are hurtful to leather.

The Draught Harness.—The attachment of the side or tug straps is another important feature. The staple on the hames should be neither too high nor too low, but at just the point where the draught will bring the collar with an even pressure upon the shoulders. If the hames are either over large or too small for the collar, it will be difficult to make a proper adjustment. For field work there should be no more gearing than possible, and when it is seen that any part of the harness galls, stop at once and make new adjustments.

To Fit a Collar.—A collar for a horse to work easily should fit well. Sufficient attention is not usually paid to this point. A large horse is made to wear a small collar, and a small horse a large collar, a thing that should not be done. When purchasing, get a collar that is well adapted to the neck and shoulders, then dip it in water until the leather is moistened through, and put the horse to work. Let it adapt itself, and dry there. It will be a good fit ever after.

Harness Blacking.—Three ounces of beeswax, four ounces ivory black, one pint neat’s-foot oil, two ounces castile soap, two ounces of lard, and one ounce of aloes; to be boiled together.

Second Formula.—Melt four ounces of mutton suet with twelve ounces of beeswax; add twelve ounces of sugar candy, four ounces of soft soap, dis-



THE DRAUGHT HARNESS.

solved in water, and two ounces of indigo finely powdered. When melted and well mixed, add half a pint of turpentine. Lay it on the harness with a sponge, and polish off with a brush.

Third Formula.—Beeswax (shred fine) eight ounces, turpentine sufficient to cover it; let them stand till the wax is dissolved (three or four days); ivory black four ounces, olive oil (I use neat's-foot oil) two ounces, Prussian blue two ounces. Rub the ivory black and Prussian blue well together to a fine powder in a mortar; then add the oil and gradually the other ingredients and thoroughly mix them. If it gets hard by keeping, soften with turpentine.

Fourth Formula.—Three ounces of turpentine, two ounces of white wax, to be dissolved together over a slow fire; then add one ounce of ivory black and one drachm of indigo, to be well pulverized and mixed together. When the wax and turpentine are dissolved, add the ivory black and indigo, and stir till cold. Apply it to the harness very thin, and brush well afterward.

Fifth Formula.—A very fine black for harness is made of quarter of a pound of beeswax, two ounces of ivory black, one ounce spirits of turpentine, one ounce of Prussian blue ground in oil, and quarter of an ounce copal varnish. Melt the wax and stir it into the other ingredients before the mixture is cold, and make it up into balls. Apply by rubbing a little upon a brush and brushing the leather lightly; polish with a piece of silk.

Heavy Harness Blacking.—A good blacking for heavy harness that has to be exposed to the weather, is made of quarter of a pound of ivory black, quarter of a pound of brown sugar, half a pound of beef tallow, and a small piece of gum arabic. Make a paste of a tablespoonful of wheat flour, and while hot put in the tallow; after it is melted, add the sugar, then add the remaining ingredients and one quart of hot water, stirring it until quite mixed. This will be found to be a cheap and serviceable blacking for heavy harness exposed to mud and rain, but is not to be commended for light gearing, as it will rub off more or less when being handled.

Blacking for Strap Edges.—Blacking for the edges of leather, where trimming has been done, or for russet leather, is made of one quart of low proof vinegar, six ounces of treacle, six ounces of ivory black, one and a half ounces vitriolic acid and one and a half ounces spermaceti. Mix the acid and oil first, afterward add the other ingredients. If it does not dry quick enough, add a little more vitriol, but be very careful about adding the vitriolic acid, as it varies a great deal in strength; if too much acid is added, it gives the blacking a brown color. It is not to be recommended for any other purpose than that specified.

Glossing Harness.—After oiling, sponge off the harness with a thick lather made of castile soap, and when dry, follow in the same manner with a solution of gum tragacanth, of which take one half ounce, and boil down with two quarts of water to three half pints. While boiling, stir the contents freely,

as the gum is apt to set to the bottom of the vessel in which it is boiled, and when nearly or quite cool lay it on quite thinly, for if laid on too thick it is apt to crack and to prove unsatisfactory.

Finishing Color.—When raw leather has been used, a finish may be given it that is black and nice, by use of the following preparation : One ounce of gum tragacanth, two ounces each of superfine ivory black, neat's-foot oil, and deep blue prepared from iron and copper ; four ounces of brown sugar, and four ounces of river water. Evaporate the water, and form the blacking into balls or cakes. When using, rub the cake over the leather, and polish with a cotton cloth.

French Polish for Harness.—Four and a half pounds of stearine, six and a half pounds turpentine, and three ounces of coloring or ivory black. Beat the stearine out to thin sheets with a mallet, then mix it with the turpentine, and subject it to a water bath. While heating, it must be stirred continually ; the coloring matter is thrown in after the mass has become thoroughly heated. It is thrown into another pot and stirred until it is cool and thick ; if not stirred, the mass will crystallize and the parts become separated. When used, it must be warmed, and a small quantity rubbed on the leather with a cloth ; use but little at a time and put on very thin.

After it has partially dried, rub with a silk cloth, and a polish will be produced equal to that of newly varnished leather. This polish is also said to be good for carriage tops, and will do no injury to leather.

Varnish for Harness.—Generally speaking I am not very much in favor of using either varnishes or polishes, but give formulas for those who think differently. Digest shellac, twelve parts ; white turpentine, five parts ; gum sandarac, two parts ; lampblack, one part ; with spirits of turpentine, four parts ; and alcohol, ninety-six parts.

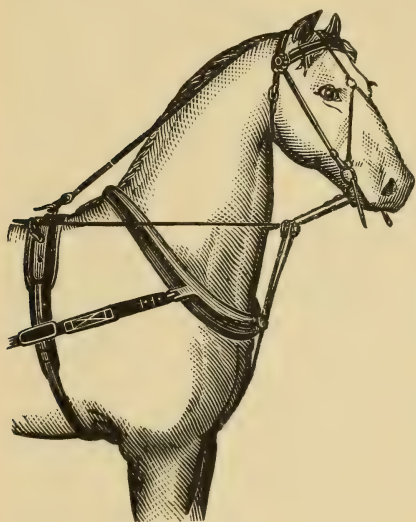
Another Method.—Half a pound of india-rubber, one gallon of spirits of turpentine ; dissolve by a little heat to make it into a jelly ; then take equal quantities of hot linseed oil and the above mixture, and incorporate them well on a slow fire.

Adjustable Bridle Bits.—A set of adjustable bridle bits may be very easily prepared by the simple application of a couple of little straps, with a buckle on one end of each, attached to the common bit. The straps can be quickly slipped through the side rings of a five ringed halter and buckled, when halter is at once converted into a bridle. Check reins can be attached also, or the hitching strap be made to answer the purpose.

Leather Bridle Bits.—It is inhuman to thrust frosted bits into a horse's mouth. It is considerable trouble to warm the bits every time a horse is harnessed and leather may be used to overcome the trouble. Ordinary bits may be covered with leather. For this purpose, use light bridle leather, draw it over the iron wet, so that the edges come together, but not to lap, channel so

as to allow the stitches to sink below the surface of the leather, cover not only the mouth piece, but also as much of the cheek piece as will be likely to touch the flesh.

Using Check Straps.—The check straps or reins are misused more frequently than any other parts of the harness. Their whole purpose is to make the horse show up nicely, and for a little carriage drive are well enough, but



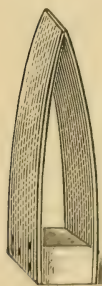
THE CHECK STRAP.

when a horse is put to heavy draughts or driven a long distance, they are simply barbarous. A man can realize something of this by attempting to walk half an hour with his head pulled back out of its natural position. A horse with an arched neck and head set well up, as in illustration, will stand the check strap with tolerable ease, while to put up the head of a differently built animal would be extremely cruel.

Mending Harness.—Time may be saved as well as much annoyance, by being able to repair breakages in the harness. All the outfit required is a straight and crooked awl, a few waxed ends, and clamps. The awls and threads may

be obtained at a shoe shop, and the clamps made at home.

Harness Clamps.—To make a pair of clamps, take a block about six inches square and after beveling two sides, screw on two boards, as illustrated, about five inches wide, thirty inches long and shaped at top so as to set closely. Two oak barrel staves properly fitted make very good clamp sides.



LEATHER CLAMP.

Punching Buckle Holes.—When it is desired to make a hole through a strap for a buckle tongue, do not attempt to make it by thrusting the blade of a knife through. If there is nothing better than the knife to use, make the hole by turning a small blade round and round, until it is drilled, instead of cut through. For making these holes nothing is so good as a punch, which may be bought for fifteen or twenty cents. Punch from back side to the front, as there is less liability of the grain of the leather cracking from the strain on the buckle tongue, and to be the cause eventually, of the leather tearing, as it causes such a crease where the tongue catches that it injures the texture of the leather and enlarges the hole more or less;

in addition to this, if the leather is very strong, the tongue of the buckle is sure to be bent out of shape. The punch should be set at an angle of about twenty degrees, cutting the hole at such an angle that the buckle tongue will rest in it without throwing any strain on the inside of the leather.

Riveting Harness Straps.—Broken straps may be mended by use of rivets, if one is not provided with the requisites for sewing. To make the work still more reliable, cement may be used in connection with the rivets (see “Cement for Leather”); however, rivets alone if of the proper size and well put in, make leather work very firm. A gentleman writes :

“I make and mend all my harness with copper belt rivets. The process is so simple, the work so secure, the time it takes to do it so trifling, and the cost so small, that any owner of a horse ought to provide himself with the requisites.

“Two rivets are enough for almost any joint in bridles, buggy harness, lines, etc. The pieces are lapped about an inch; two holes are punched upon a piece of lead or a hard piece of wood, with the hand or hammer punch, as the case may be; the rivets are put in from the under side (with the head end always toward the horse, so as not to chafe the skin). The rivets should be cut right length before inserting. The rivet is now headed down by a few light taps of the brad hammer, and the new head smoothed down with a few light taps of the driving end of the hammer, and the joint is complete, and will never give way till the leather rots; and it is all done before you can make a waxed end, or before you could make the holes with the awl, if you had the end ready.

“One caution is necessary; a beginner is very apt to head down too hard, by which means the head end of the rivet is forced through the leather on the under side, and the joint unbuttons, as sometimes called, and is worthless. A little care will obviate this trouble.

Rivets and Punches.—“The convenient sizes of rivets are $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$, for the different thicknesses of leather. The smallest for bridle reins or any single or light strap. They are called No. 12, and count four and five hundred per pound. Two punches of different sizes are required, one for large rivets and the other for small. It is very convenient to have a spring hand punch, with tubes of two sizes; but in wide work, the straight hammer punch, already mentioned, is necessary.

Harness Knife.—“The harness knife is indispensable. I used a straight edge a while; but it was very troublesome. The knife should be gauged to cut from half an inch to four inches. Mine is home-made; the handle is hickory, and the graduated slide is fastened at any desired point with a wedge; the knife part can be made at the grindstone, out of an old piece of broken scythe blade, a broken pocket or shoe knife blade, or any other thin piece of steel which can be held with nippers or a hand vise, and ground to shape in a few minutes; my knife cuts anything, from a shoe string to a five inch back band. A good article can be bought for about seventy-five cents

The Brad Hammer.—"The brad hammer should be light, but heavy enough to do any ordinary nail driving. My blacksmith has just made me one for forty cents. A late improvement in hammers is a cast steel brad and claw hammer combined, which serves both purposes admirably, and is very convenient.

Trimming Nippers.—"The trimmer's nippers are very necessary. If a brad is too short no harm can be done; but if it is too long, an inexperienced hand is apt to try to head it down anyhow. The result is that the brad is bent, an ugly, rough lump of a head is made, and generally, the hard hammering necessary, forces the head end of the brad through the leather on the under side, and the joint is worthless. This is all avoided by cutting the rivet down to the right length by the nippers before the hammer touches it. These same trimmer's nippers are very useful for drawing any kind of a nail, cutting nails, cutting wire for fence ties, twisting wire bands, etc., etc.

Work Horse Gearing.—"There is a great deal in gearing a horse so as to enable the animal to work easily and use a certain amount of power, with comparatively small animal force. Much depends on long or short leverage. The draught may be too high or too low; the one will draw too heavy on the top of the neck, the other will choke the animal. The collar may be too large or too small—either of which will cause sore shoulders. A tender-mouthed horse should have a large, smooth bit, and not be reined up too tight, or the mouth will become so sore as to lose its sensitiveness to a gentle draw of the rein. Every part of the harness should be as complete a fit as a dandy's coat, touching everywhere and pinching nowhere."

HOW TO SHOE A HORSE.

Errors in Shoeing.—Veterinary surgeon G. W. Ainger furnished the author of this work his written opinion upon the important matter of shoeing the horse, which I deem most excellent authority:

It is utterly impossible in an article like this to go into an elaborate discussion upon the art of shoeing a horse, or to detail the exact manner a horse should be shod, for individuals differ, and horses' feet are not all alike; but I will point to a few errors common in horse shoeing in the country, and in which I think the owner of the horse quite as much to blame as the blacksmith.

The fault of the owner consists in not being at all satisfied if the shoes do not remain for at least three or four months, and the blacksmith well understands that the bread for his family depends upon the length of time the shoes remain, rather than the health and future usefulness of the horse, and here I

would remark, that a shoe should never, under any circumstances, remain on a horse more than two months, and a less time would be all the better.

Paring a Horse's Foot.—The first operation generally after the horse arrives at the forge for shoeing, is to tear off the old shoes, if any are on; then the shoer takes his knives, and the process of paring out the hoof commences. This procedure is as barbarous as it is unnecessary and unreasonable, especially when carried to the extent that it often is, viz.: to pare the sole until it springs to the pressure of the thumb. In the great majority of shops this most pernicious practice is carried out, either because the owner of the horse thinks it necessary or the blacksmith that it is more workmanlike, though if he is pressed hard for any other reason, he is unable to give one of a satisfactory character.

The practice of the paring of the sole is, in my opinion, absurd in the extreme, and has not the most trifling recommendation to support it. Nor do I believe that in the operation of shoeing a horse, an edged tool should ever be used. The rasp is all that is necessary, and that should be used with extreme caution.

Anatomy of the Horse's Foot.—In the natural construction of the horse's foot, the horn is secreted from the living surface, and myriads of beautiful vascular and sensitive tufts dependent from this surface enter the horn fibers to a certain depth, and play an important part in the formation of the sole. The newly formed horn is soft and spongy and incapable of resisting exposure to the air; but as it is pushed further away from this surface by successive deposits of fresh material, it becomes old horn, loses its moisture, and in doing so acquires hardness sufficient to withstand external influences. Then it is subjected to wear, and if this be insufficient to reduce sufficiently, it falls off in scales. This natural diminution in the excess of horn of the sole is a most beneficial process for the hoof.

Horn is a slow conductor of heat and cold, and when thick retains moisture for a long period. These flakes then act as a natural "stopping" to the hoof by accumulating and retaining moisture beneath, and this not only keeps the foot cool as it slowly evaporates, but insures for the solid and growing horn, its toughness, elasticity and proper development. In addition to this, every flake acts more or less as a spring in warding off bruises or other injuries to the sole. Any one can readily understand the damage that must result in consequence of the sole being thus ruthlessly denuded of its protection and exposed to the most serious injury.

Frog of the Horse's Foot.—Next comes the paring of the frog. It seems to be the opinion of nearly all blacksmiths that it requires cutting to prevent its coming on the ground and laming the horse.

There never was a horse yet lamed by his frog coming in contact with the ground, and horses are often benefited by having a direct pressure of the frog

upon the ground, and many horses are at work every day upon hard pavements with a bar shoe so arranged as to sustain the whole pressure of the posterior portion of the hoof on the frog, and thereby relieve the quarters or pressure on corns and other troubles. Then, gentlemen, leave the frogs entirely alone.

Heel of the Horse's Foot.—Then comes the opening of the heels. Having done everything possible to ruin the sole and frog, the blacksmith proceeds to complete the work by opening the heels. You ask him why, and he answers, "to give the heels a chance to expand." Now lift up your horse's foot and examine it, and if you are then satisfied that from the natural shape of the hoof, that the pressure of the weight of the horse upon the foot must crowd the heels nearer together, were it not for the beautiful protection that nature has provided in the bars and braces at the side of the frog terminating at the heels, and the utility of which is entirely destroyed by the opening process, then be sure to order your blacksmith to let the heels alone.

Putting on a Horseshoe.—See to it that the shoe is constructed to fit the foot, not the foot cut down to fit the shoe. That the bearing surface of the shoe is smooth and level. That the nails are not too large, and never to exceed seven in number, four on the outside and three on the inside of the foot, and don't forget to send your horse back to the forge in about six weeks, to have them reset, and my word for it, you will have less lame horses and better travelers, and in any event your horse will feel grateful for the change.

Toe Calks for Horseshoes.—Another good authority, writing upon this subject, says that blacksmiths sometimes swindle their customers by forging calks from a piece of some old horse shoe which a customer has thrown away, and which will require sharpening every three days. When toe calks are made, good steel should be employed; and every calk should be tempered as hard as a cold chisel for cutting hard iron.

After a calk has been tempered, attempt to file it. If the file will not cut the surface, the metal is sufficiently hard to wear a long time and keep sharp.

Owners of horses should keep awake to the difference between soft iron and tough, hard steel in the toe calk.

Two cents' worth of steel per shoe, properly tempered, would frequently have saved the price of resetting and sharpening the calks, besides preventing, perhaps, some serious injury to the horse, in consequence of slipping when his calks were dull.

Another author says, that where horses are to be used in hilly sections, the toe calks should be made with special reference to drawing a load up hill, and this change will not injure the shoe for common use. He says: It must be quite evident that the greater expanse of bearing we give a foot on the earth, the firmer must be the tread, and as the hind foot is the great fulcrum by which a horse gets up hill with a load, too much attention cannot be given to effect the firmest hold for it. The toes of shoes are very generally made round, or

nearly so; the consequence is, the horse's toe comes to the ground on a very small segment of circle—in fact, on a pivot—the effect of which is, the foot turns to the right and left, and the legs and hocks naturally follow the turn of the foot; this, of course, produces the twisting of the hocks; and the leg not being able to be kept straight, the horse loses a large portion of his powers; spavins, curbs, thoroughpins, and strained ligaments are the future consequences, and fatigue the present one.

The shoe should be made square at the toe to the very *extreme verge* of the foot, it then comes to the ground with from two inches to two inches and a-half firm hold; whereas, in many instances it has not half an inch; indeed, sometimes (if newly shod) less.

Adjusting the Shoe.—It is a bad practice some blacksmiths have of hammering the shoe on the one side or the other after three or four nails have been driven, for the purpose of putting it straight on the foot. This is a speedy method of making up for his total want of accuracy in placing it at first; but it should never be practiced. It strains all the nails which have already been driven, and is thus calculated to do serious damage to the foot.

MANAGING TEAMS.

How to Unhitch a Team.—There is always a right way to do everything, and the right way to unhitch a team is that which is quickest and safest. I have often noticed farm boys, and not only farm boys, but men, disconnect a team from a wagon in a very unsafe manner; something as follows:

The driver springs from the wagon, goes to the side of the horses, puts up the lines, unbuckles them at the bits, lets down the neck yoke, unhitches the tugs and leads the horses away disconnected.

Now this mode is very common, and very risky. Let us notice why: In the first place, as soon as the lines are put up you have lost your means of control, as soon as the pole is down your horses are in peril. Supposing they should take fright, which is common to the most quiet animals, the result of a team running with only the tugs hitched can be imagined. I have cases in mind where horses have sped away with maddened fury in exactly this condition, the pole plowing the ground, and at every plunge of the frenzied animals, the wagon striking their heels, frightening them to perfect desperation.

Now the right way, or a good way at least, is to keep the lines in hands or where they can be reached until the tugs are *all* unhitched, then your team is free from the wagon, unless a stationary neck yoke is used, next go directly in

front of the horses and let down the neck yoke, and after this separate them as convenient.

Working Double Teams.—Whenever one span of horses is hitched before another, if the leaders are hitched to the end of the tongue, it should be lowered to a horizontal position. Or a chain may extend from the whippletrees of the leaders to the hind end of the tongue. If the tongue is not horizontal, a large portion of the strain will bear like a heavy burden on the necks of the wheelers.

PAINTS AND PAINTING.

Value of Paint.—If every one fully realized the value of paint and varnish there would be a much greater amount used than there has been heretofore, and thousands of dollars saved to the country; for I really believe that there is more property lost annually by the decay of material substances which might be preserved, than is expended for paints. Paint not only preserves wood, but improves it in appearance, and enhances its value four times the cost of material used. A house upon the farm, or in the village, well painted, always commands an extra price of at least one hundred dollars for every twenty-five expended in beautifying it.

Foundation for Paint.—Many suppose that it is economy, when a good coat of paint is desired, to use for priming some cheap substance mixed with oil, but that is a mistaken policy. Cheap paints do not fill up the grains of the wood and adhere firmly. It is much better to use pure white lead for the first coat, and cheaper paints for finishing; but this is not advisable. Use good material from the foundation up to the finishing coat. It is cheaper in the long run. Sometimes, for old, weather-beaten siding, it may be advisable to use about one half common whiting and one half white lead, adding a small portion of red lead and chrome yellow to overcome the blackness of the wood, or add umber for a drab color.

Time for Outdoor Painting.—It is not advisable to do house painting in midsummer, for then the atmosphere is filled with dust and insects, and more or less will settle upon, and be retained by fresh paint. Besides this, in hot weather, the oil is rapidly absorbed by the wood and the lead is left upon the hot surface in a comparatively lifeless condition; paint should be two or three days hardening to be tough and durable. Fall and spring are the best seasons; then the paint will dry hard and glossy, and withstand the storms of years.

Getting Ready to Paint.—If raw material is to be used, mix the paint

a day or two before it is to be applied, but do not put in the drier until painting is to begin. If a colored coat is to be applied, work the mixture thoroughly, and try it upon a piece of board to see that the shade is as desired, and that it does not work streaked. Do not mix less than you think will be required to do the whole job, especially for the last coat, so that all will be alike. Prepare the surface to be painted before you begin.

Sand paper when necessary, and have putty ready to fill up holes after the priming coat. On a building nail down all loose boards. See that the wood is dry before beginning to apply the paint. Put in no more drier than is absolutely necessary.

How to Lay on Paint.—Dip only the end of the brush into the paint, and begin at the highest point to be coated. By so doing all the drops and spatters are swept away as you go down. Begin at one end or corner, and after the surface is coated, sweep from end inward, allowing the brush to recede gradually from the surface; never stop the brush abruptly.

After making the start, then sweep the other way, allowing the brush to recede as swept on to the first patch painted, and so on to the end of the job. Do not try to get on a heavy coat, or to economize by a thin one, and do not apply a succeeding coat before the previous one is dry. Do not use a lighter color over a darker one. When the brush is well loaded with paint, work it upon such places as need protection most, and use less upon plain, smooth surfaces.

The more open and rough the wood, the more use of heavy pressure, and a thorough working of the brush.

Painting Windows.—Do not attempt to paint sashes when in the frames. Use a small brush upon windows, turning the sash over as fast as one side is finished. Here, too, precaution should be used against loading the brush too heavily.

Driers for Paint.—Japan has been for a long time a very popular material for a drier, but unless a good article, is a detriment to paint, as it causes cracking and chipping, and consequently injures the surface. Use a good article, and, as before said, as little as will do the work. Turpentine is a detriment to paint, if used in any considerable amount. Painters like to use it, for it makes an easier flow of the material. To be convinced that spirits of turpentine injures the durability of paint, it is only necessary to observe the effects produced by using it as a means of removing paint spots on wood or cloth.

To Select Linseed Oil.—The best linseed oil is yellow, transparent, comparatively sweet scented, and has a flavor resembling that of the cucumber.

Testing White Lead.—As white lead is the foundation of very many of the paints used, it is economy to purchase only a good article. If it is under

price, it should be rejected ; if it is bulky, it is adulterated with Spanish whitening. To test it, place a small quantity on a shovel and hold it over a fire ; if it is pure, it will retain its color, but if there be any impure article in it, it will turn to a dull gray shade, and will crumble.

To Test Ground Paints.—Spread a little upon the thumb nail ; if it is full of specks, it is evidence of its not being sufficiently ground, and if it has a dead and watery look, know that it is made of cheap material. Good paint, when it is spread thin upon a smooth surface, will have a fine, lively appearance, and be very adhesive.

Test for Ultramarine.—The color should be lively and the substance well ground. Test by placing a little on the thumb nail and rubbing it with the ball of the finger. If full of hard specks do not buy it. To determine whether or not it is pure and unadulterated, put a little into an iron vessel and heat it red hot. If the powder has not changed color after the trial, it is certainly pure ; on the contrary, if there be any change or any black specks in it then it has been adulterated. True ultramarine blue, dropped into lemon juice, loses its color.

To Test Vermilion.—Apply to the paint muriatic acid ; if your vermilion be pure it will not hurt it ; but if it be impure it will turn white or gray. Orange vermilion is the best used ; it stands the same test as dark vermilion.

Test for Madder Lakes.—The best madder lakes are not soluble in liquid ammonia, but bad lakes are soluble. The best carmine lake should be very vivid, bordering somewhat on the purple, and is of an almost impalpable powder.

Raw and Boiled Oil.—There is a great difference of opinion as to the value of raw and boiled oil for general use. A majority of painters use the boiled, as it requires less drying, but a long experience with the two has convinced me that raw oil should be used for outside work, and boiled oil for inside work. I have made practical tests, and convinced old painters who were positive before, that boiled oil should be used only for inside work, not exposed to the influence of the weather.

To Boil Oil for Drying.—Fill an iron kettle about half full of good raw linseed oil, and to each gallon add one ounce of litharge. Heat until it settles all the foam that rises, and a light blue smoke appears. Some test the heat by dipping in a feather. If the feather is scorched, enough cooking has been done. The kettle should be set in a little arch out of doors for the boiling. If it is desired to make the oil dry very quickly, add more litharge, and continue heat for quarter of an hour after blue smoke appears.

To Keep Mixed Paints.—After finishing a job, if there is a quantity of paint left to be used some future time, pour over the substance sufficient raw linseed oil to form a coating a quarter of an inch thick, and set the dish away. When wanted for use pour off the oil, and stir up the paint again.

Benzine for Painting.—Any material that will not exclude water sufficiently to prevent the expansion of the grain of the timber, must be comparatively worthless for paint. Linseed oil possesses the property of drying when spread on a surface, and forming a tenacious covering, impervious to water. Spirits of turpentine, benzine, benzole, and certain kinds of lubricating oil, all of which are frequently used in preparing paint, will not form a covering sufficiently tough and hard to resist the action of water; for which reason the paint that is made by employing these volatile materials will be found comparatively worthless for outside work.

To Select Good Turpentine.—Turpentine, to be good, should be clear and white as water, of a strong, penetrating smell, and very inflammable.

Time for Drying Paints.—Plenty of time should be given one coat to dry before another is applied. Two weeks is always better than two days, therefore do not be in a hurry. Other things being equal, paint and varnish dry more quickly at a temperature of 80 degrees than below. This explains why in practice the proportions of the drier should vary in summer and winter, in mixing paints for outside work, and it shows also why paint shops should always be kept at a summer temperature.

Experiments have proved that a coat of ordinary white lead absorbs in drying about three per cent. of its weight in oxygen. The time required for this absorption, when no drier is used, depends upon the nature of the pigment used. Thus, while white lead mixed with raw oil, in a certain series of experiments, became dry in three days, zinc white required seven days, antimony white fourteen days, and the arseniate of tin, also a white pigment, was quite fresh after an interval of two months.

Test for Japan Drier.—Pour out a few drops of Japan on a stone or a piece of glass, and add two or three drops of raw linseed oil. Stir the two together, and if the oil readily combines with the Japan, the drier is of a quality safe to be used on carriage work. If the Japan repels the oil and the end of the stick becomes gummy, the Japan is worthless.

Painting Vehicles.—Vehicles require a greater time for drying between coats than a plain surface, as the side of a house. Vehicles are exposed to harder usage, and the paint should be tough. Where sufficient time is not given to dry, the paint is liable to crack, as the coats dry unevenly. Where it is desired to dress up a vehicle on which the old coat is cracked, the defective paint should be removed by heat.

To Remove Old Paint.—Alcohol and turpentine, equal parts, put on and ignited, will answer. The gas jet heats slowly, and softens the paint sufficiently to admit of its being removed before the heat has penetrated far enough down to injure the joints, or draw the oil out of the wood. Having removed the cracked paint, the job must be carried through the same process as when first painted. See "Wagon Painting."

Painting Whitewashed Walls.—Where it is desired to paint a plastered wall, the first thing to do is to prepare the wall for the paint. If it has been whitewashed and the coating is loose, or inclined to scale, scrape it thoroughly with a flat steel instrument like a piece of saw blade, a plane bit, or case knife, being careful not to cut or furrow the plastering. Go over with sand paper and brush off thoroughly.

If the wall is cracked, fill with plaster of Paris wet with water and vinegar. The acid will prevent the plaster setting too quickly. Smooth down nicely, and the spot will not show, providing the wall is solid each side of the crack and the work is properly done. Do not use putty to fill cracks in plastered walls. For first coat use about two pounds of white lead to each quart of oil; for second coat five pounds pure lead to each quart of oil well ground. Use such pigments as required to produce the tint desired; begin with the tint in first coat. A gill of drier should be added to each gallon of paint if raw oil is used. The paint may be enlivened by the use of dammar varnish in the last coat. Gloss for a wall, to my taste, is not as nice as a flat color.

Painting Wood Floors.—The great trouble in painting floors is the inconvenience in allowing time for them to dry, until hard and solid. To be durable, several days are required for drying, the longer the better. Yellow ocher and oil—a pound and a half to a quart, and plenty of Japan drier is commonly used for kitchens. Some use half Japan varnish and oil, which make a hard and glossy finish. Putty mixed with litharge is good for filling cracks. It is a good plan to sand paper after the second coat. Of course, any color may be used one desires. Dark gray does not show dirt.

Painting Brick Work.—Brick work should be dry when paint is applied; therefore, it should be done in warm, dry weather. This is necessary to make the paint adhere well. Where there is a double exposure of brick, both surfaces should be coated, for water taken in on one side will pass through and loosen the paint on the other.

Paints for Bricks.—A good coating for brick is made of equal parts of yellow ocher and zinc mixed in oil. It makes a soft, mellow color, and one very durable. The common mixture for houses is made of Venetian red and red oxide of iron.

“When work is painted simply to preserve it from the action of the weather, color and appearance are frequently unimportant considerations; and whatever material will most economically realize the desired result is most desirable. The deposits of ocher were deposited in ages long past, and it is reasonable to suppose that if these materials had been liable to change, the change would have taken place during the ages that they remained unappropriated to the use of man; but experience teaches that they are not subject to those changes which belong to most of the artificial products used in painting.”

Painting Brick Work Joints.—“The joints in the stone coping on

brick walls require constant looking after. These should be made absolutely impervious to water by the application of a mass of soft paint-skins, both on the top and edges; and when this hardens to the point of cracking, it should be removed and renewed. Mortar and cement for such purposes are altogether useless. The joint, too, between the wall and the coping underneath should be well filled with paint-skins before painting; for no matter how water-proof the surface may be, if the water be allowed to percolate through the joints in the coping, the integrity of the wall will be destroyed."

How to Paint Zinc.—A difficulty is often experienced in causing oil colors to adhere to sheet zinc. Boettger recommends the employment of a mordant, so to speak, of the following composition: One part of chloride of copper, one of nitrate of copper, and one of sal ammoniac are to be dissolved in sixty-four parts of water; to which solution is to be added one part of commercial hydrochloric acid.

The sheets of zinc are to be brushed over with this liquid, which gives them a deep black color; in the course of from twelve to twenty-four hours they become dry, and to their now dirty gray surface a coat of any oil color will firmly adhere. Some sheets of zinc prepared in this way and afterward painted, have been found to entirely withstand all the atmospheric changes of winter and summer.

Painting Stoves.—A writer in an English magazine proposes, instead of black leading stoves and grates, that they should be painted with liquid glass (silicate of potash), coloring with pigment to harmonize with the color of the apartment. Before this is applied the iron must be thoroughly cleansed from grease and all rust rubbed off with a scratch brush. Two or three coats of the paint may then be put on and allowed to dry, after which the fire may be lighted without fear of injury to the color; it may indeed be exposed to a red heat without damaging the paint. Grease or milk spilt over the paint has no effect upon it, and it may be kept clean by washing with soap and water. While it is not probable that it will ever come into general use for stoves, it may be applied to other iron utensils. A good coating, it is said, will stand heat for two years.

Paint for Kitchens.—Why there are so many kitchens but little more inviting than a dungeon, I cannot tell, unless the cause lies in the mistaken belief that dark colors show dirt and smoke less than others. Perhaps it is this belief that has led so many to use dark blue and lead colored paints, and dark paper for their kitchen walls; if so, they have used them by force of custom and never after once trying the opposite. Any person accustomed to a kitchen covered with dark paint and paper, would be astonished at the wonderful change made in the appearance of the room by using lighter material.

The cost of the latter is no more than the former, and of course the expense of putting them on would be alike, but the gain is in the transformation of a

prison-like room into one light, airy and home-like. Then why have gloomy kitchens?

A light stone color is cheap and durable, besides it shows dirt less than any other save oak graining, and after it has been in use three years, presents a better appearance than a lead or blue color three weeks after being spread. If the window sashes of the kitchen are painted snow white, and the wall overhead thoroughly whitewashed, the reflection of light into the room will be increased twofold.

Color of Paint for Sleighs.—Use bright colors. Vermilion and lemon are favorite colors. Chinese vermilion is the finest of all reds; it covers well, also holds its color and works smoothly. Carmine and red lead are also used. The latter is the cheapest, but it requires much care to grind it fine. Lemon color is very popular for running parts. Use chrome yellow. Golden brown is very popular. It is made by mixing umber with chrome yellow. The finest green is the Paris; that sold in cans ground in oil, is of a very rich color. It can be reduced by mixing with it a little white, or yellow pink. The richest of all blues is the ultramarine. It is very expensive, but as it has a good body, but very little is required to paint the panels of a sleigh. Prussian blue is the next best. It is a very rich color and covers well.

Sickness from Paint.—Those who are in constant use of paints are very liable to receive, after a time, serious effects from it. White lead, which is a carbonate of lead, is one of the most poisonous ingredients in use. Some persons cannot endure the odor from this when it is wet up in oil, for a moment, without experiencing a sickening sensation; others will use it for months, or perhaps years, before they realize harm, and then suffer the most acute pain, which is termed painter's colic.

Poison from Paint.—I have seen paralysis of the hands and bad ulcers as the result of lead poisoning.

Injury is received from lead in two ways, by its coming in contact with the person, and by inhaling the poisonous, subtle emanations that arise in the atmosphere. The latter may be avoided to some extent by keeping the paint room cool and well ventilated, and when working out of doors, by avoiding the direct rays of the sun.

When the weather is cool enough to admit of it, thin leather gloves may be worn to prevent the paint from coming in contact with the person; this is particularly important in the use of lead, Paris and chrome greens, and in the use of any other paint where spirits of turpentine is used. A few drops of turpentine applied to the palm of the hand will penetrate the whole system, and if very much is absorbed, the joints are weakened by it.

Caution to Painters.—Workers in lead should wash their hands frequently in a decoction of oak bark, wear short hair, and, during work, cloth caps. The hands should be cleansed, and the mouth well rinsed with cold

water before eating. The food should contain a large proportion of fat, and milk should be taken in large quantities. If these simple rules are strictly observed, there is little danger of poison from the use of paint.

To Prevent Vermilion Changing.—It is a fact well known to artists that the splendidly bright color of vermilion (cinnabar, sulphide of mercury) has a tendency, especially if it has been mixed with white lead, to become blackish brown and very dark colored in a comparatively short time. This tendency of the vermilion is altogether obviated if, previous to being mixed with oil, it is thoroughly and intimately mingled with about one-eighth of flour of sulphur.

To Remove Paint from Stone.—Put three pounds of sal-soda (washing soda) into a gallon of water, heat to a boiling point, and apply with a brush. It will soften the paint in a short time, so that it can be cut away or scoured off with a scrubbing brush. The solution is improved by the addition of a few ounces of potash, where the paint is very hard.

Renewing Old Paint.—When paint has an old, dingy look, take a flannel cloth, dampen it, and apply as much first quality Spanish whiting as will adhere to it, and rub the paint. But little rubbing will be required to remove all dirt and grease. Rinse thoroughly with pure water, and then rub dry with a soft cloth. Paint thus cleaned looks like new, and does not receive such injury as from soap suds. This process of cleaning is a good one to perform before laying varnish over old paint.

To Make Paint Shine Without Varnish.—Add to one gallon of linseed oil two ounces of burnt umber, the same of black lead, and one fourth pound of litharge; boil all together. Paints mixed with this oil will dry very quickly, have a hard finish and shine nearly as much as if varnished. It may be used profitably for indoor painting, and the last coat upon wagons and carriages, where the colors are dark.

To Purify Lampblack.—It is said that with very little trouble, common lampblack may be made to answer the purpose of some of the finer blacks at a much less cost. Take a sheet-iron pan, place it over a hot fire and fill it to the depth of about two inches with lampblack; stir this until it all becomes hot; let it remain over the fire until the dirty smoke which commences to rise from first heat has ceased, when it becomes red hot; if no smoke rises from it on being stirred, remove it from the fire and when cool it will be found to be much improved in color.

Black Paint for Cameras, etc.—The best paint for this purpose is composed of shellac dissolved in alcohol and mixed with a large proportion of lampblack. If the proportion of shellac be large, the paint will retain a glossy surface, which is very detrimental. What is wanted is a smooth, dead black surface; and this is obtained by using just enough shellac to prevent the lampblack from rubbing off, and no more. A few trials will easily enable us to

determine the proper proportions, and then we shall have a paint which cannot be excelled.

To Soften Paint and Putty.—Mix equal parts of good soap, potash and slaked lime; add sufficient water to form a paste; apply this with a brush and let it stand some three or four hours, and your putty or paint will be softened, so that it can be easily removed with a blunt chisel. This is a good way to remove the paint from an old carriage body.

Zinc Coating for Rooms.—The following I have never tested, but it is said to be cheap and durable: A zinc wash for rooms is made of oxide of zinc mixed with common size, and applied like whitewash. After it is dry, put on a wash of chloride of zinc, which will produce a glossy surface.

To Make a China Gloss.—A beautiful china gloss, or pearl finish, may be given a parlor wood work by mixing zinc with dammar varnish and turpentine—no oil. A good foundation should be prepared first, as this mixture is somewhat transparent. After two coats of white lead and a third of common zinc paint, apply the china gloss. The painter must be lively, as the gloss sets almost as quickly as varnish. This finish is very durable.

Economy in Good Paints.—It is better to pay double price for a good article, for no matter how much pains you may take with a job, if the foundation is not good the paint will not stand. There is too much carelessness in mixing priming, the coat of all others that should be of the first quality; a good priming is made by mixing the best of white lead, having just enough lamp-black in it to give it a light gray shade, with linseed oil; do not put turpentine in the priming; if the weather is not favorable for drying, or the job is in a hurry, use a little of the best drier, or, if inside work, boiled oil and drier should be used.

Paint for Buried Wood.—The simplest and perhaps best paint to prevent buried wood from decaying is made of boiled linseed oil, into which charcoal is stirred until the whole is of proper consistency. Apply with an ordinary paint brush.

Paint to Stand Boiling Water.—Yellow ocher in linseed oil is one of the best paints that I have ever used for coating any substance coming in direct contact with hot water, such as cheese vats, etc.

Removing Paint from Wood.—Where it is not convenient to apply heat, slake three pounds of quicklime in water, and add one pound of pearlash, making the whole into the consistence of paint. Lay this over the old work with a brush, and let it remain from twelve to fourteen hours, when the paint will be easily scraped off.

Zinc for Outside Work.—Zinc and oil alone are not suitable for house painting. First form a good coating with well prepared white lead, and if it is desired to have a clear white, use zinc for finishing coat, using considerable drier. A house thus painted will endure the weather for years.

Yellow Ocher for Rooms.—The use of yellow ocher in coloring the walls of rooms is condemned by the *Builder*. The occupants of such apartments, it says, invariably complain of pain in the forehead and eyes, often being unable to work. When the walls are cleaned of the ocher and white-washed these ailments entirely disappear.

Painting Over Lime.—Never apply whitewash or other cheap mixture to any building, fence or implement that you intend to paint with oil and lead afterward.

How to Copy a Scroll.—When it is desired to copy a scroll for ornamenting a vehicle or other painted article, procure a piece of transparent paper—oiled paper will do—lay this over the scroll or ornamental striping, and trace the outlines carefully with a pencil, writing over each section the color. After removing the paper, follow along these pencil lines with a pin, pricking holes every quarter of an inch at least, and more frequently in fine parts. This makes the pattern. To reproduce, lay the paper on your painted surface and tamp along the lines a little bag of Spanish whiting—a little rag with whiting tied in tightly will do. Dotted lines will be left as a guide for striping and ornamenting.

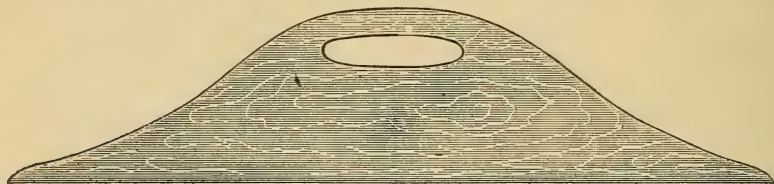
Cheap Way to Grind Paint.—Take a small tin or wooden pail and lay a good strong piece of cotton cloth over the top and tack to the sides; if of wood, or if of tin, tie a string around under the wire at the top, then bag the cloth in the center and put in the paint and rub it through with a stick, two inches in diameter, six inches long, well rounded and smoothed at the end. Mix the paint thoroughly before putting it into the strainer. After being rubbed through a cloth, paint is sufficiently ground for ordinary work. It works admirably, also, for mixing colors.

Why Paint Cracks.—There are many theories why paint cracks, and absurd ones too. Some lay it to absorption of the oil by wood, but such should be convinced that this is not correct, by observing that the same material spread upon iron or steel, or even glass, will crack just the same. Experience has taught me that it may arise from three causes; poor material, boiled oil, and applying coats of paint with too little time for drying between them.

Boiled oil will appear to dry very rapidly, and the surface will become glazed over, but beneath this thin, hard glaze the paint is only gummed. Where but one coat of paint is applied, there is little, if any, difficulty about cracking; but as there are generally from three to four coats, the paint does not become thoroughly dry on each, although it may appear to be so on the surface. The atmosphere will in time complete the drying, but as a consequence, the coats dry unevenly and crack by the gradual contractions of the gummy portions beneath. To obviate the trouble, good pigments only should be used, and mixed with raw oil, and then plenty of time given for each separate coat to dry. The hardening may be advanced by the use of drier, but do not put in more than an ounce to

the pound. But very little, if any, turpentine should be used. Too much drier will cause paint to contract rapidly and form fine checks, which will afterward increase in size.

The Paint Board.—One difficulty that the amateur encounters in painting, is the liability to touch parts that are not to be dressed when applying a



A HANDY PAINT BOARD.

coating to casings, or parts where other colors are to be used. To obviate that trouble use what I call a paint board. It should be about six inches wide, two feet long, and half an inch thick. Shape and cut a hand hole as illustrated. Plane long edge down on one side until quite sharp. This board is held in the left hand to protect parts not to be touched. It makes a good paper border protector also when whitewashing a room.



COLORS AND SHADES IN PAINTS.

Harmony of Colors.—To get harmony of colors red looks well with black, white, or yellow; blue with white and yellow; green with white, black, and yellow; white with any color.

Mixing Paints for Color.—It should be remembered that one cannot tell the exact shade of paint by seeing it in the dish; a little must be spread, and well worked down with the brush to develop the true tint. Where a shade is to be obtained by adding a pigment to white, the paint must be thoroughly worked to bring out the tint in a uniform surface. After mixing well grind it on a stone or through a cloth.

Red Paints.—Chinese vermilion is the richest and most beautiful of all reds. American vermilion of good quality is quite attractive. Red lead comes third, and Venetian red last. Any of these may be varied by the use of white.

Olive Color.—Olive may be made by mixing violet and green in equal parts, or black and a little blue with yellow ocher, or other mixtures that give a dark brownish green color. The shade may be varied by frequent tests, until it pleases the fancy. Burnt verdigris makes an olive color, and dries well. All copper greens make good olives, when burned.

Light Blue.—Take ground white lead and linseed oil, and mix to about the thickness of cream, or a little thinner, then add Prussian blue to suit the taste. But little of the blue is required, and the only way to test the shade is to thoroughly mix in a very small quantity at first, and try by spreading a little with the brush.

Pearl Gray.—Mix white oxide of lead with pure ivory black ; a fine flaxen gray by mixing dry white lead with lake and Prussian blue, the proportions to be governed by the shade desired, grind in oil ; this is the best gray, as it will not fade like all other grays.

To Make a Buff.—To get a good buff, or straw color, mix yellow ochre with zinc or lead, shade to please the eye.

To Make Canary Yellow.—This very attractive shade is produced by mixing chrome yellow with white, or the buff may be made a canary tint by the addition of chrome yellow.

Purple Paint.—Purple may be made by mixing dark red with violet color, or by the use of the lake known in the market as purple lake. Purple lakes, however, will not last ; they soon fade and become cloudy. Rose colors of madder and pure ultramarine make the best purples for standing, as light and impure air will not affect them. Ultramarine and pure vermilion are equally as permanent, but less transparent. A purple from one color can be made, which is very durable, by burning madder carmine, stirring it until it becomes the color required.

Portland Stone Color.—Umber and white, or umber, sienna and white ; black and white, gray or stone white ; or white, umber and yellow, make Portland stone.

Blue Limestone.—White lead, twenty-five parts ; burnt umber, two parts ; ultramarine blue, one-half part ; all ground in oil. These shades may be modified to suit the taste.

Violet Colors.—Violet colors may be made by use of red and black, red and blue ; but the richest is made by the combination of red, white, and blue. No rule can be given for mixing, as tastes differ so much. By a union of the three last colors, one can obtain a pleasing violet.

Chestnut Color.—This may be produced by the mixture of red, yellow, and a little black.

To Make a Drab.—Lampblack in zinc makes a drab. It may be produced also by use of umber and metallic brown paints.

Peach-blow Color.—This is produced by adding a little red to white. A very delicate color can be made, by use of zinc and red lead ; cheaper, by using Spanish whiting and white lead, equal parts, tinted by Venetian red.

Dark Lead Color.—A dark lead color is made by the addition of lampblack to white lead. The shade may be varied and enriched by the use of a little indigo.

Indigo for Paint.—Indigo is a cheap and durable blue ; it grinds fine and bears a good body ; its natural color being very dark, it can easily be toned to any desirable shade, by mixing in a small quantity of white lead. The two should be thoroughly worked together.

Green Paints.—Paris green is one of the best shades we have, but it is objectionable on account of its poisonous qualities. The commercial prepared green is very good, but all the green paints will fade. A very pretty shade may be obtained by mixing blue and yellow.

Flat Zinc.—Oil and zinc lead make a bright paint, but by mixing the zinc with turpentine alone, a flat white is obtained. It dries very quickly, and will answer only for inside work.

Mahogany Color.—To make a very pretty, and yet cheap, mahogany colored paint, add a little lampblack to Venetian red and oil.

To Make a Rose Color.—Carminated lake with the addition of a little Chinese vermilion and white lead or zinc, makes a very rich rose color.

To Make an Ash Color.—An ash or gray color may be made by mixing white and black, or white with blue and black.

Colors for Shading.—In shading, white is shaded with black, and contrariwise, yellow with umber and the ochers, vermilion with lake, blue with indigo, coal black with roseate, etc.

To Make Brass Color.—Any good lacquer laid upon tin, gives it the appearance of copper or brass, it is said. It is made by coloring lac varnish with turmeric, to impart the color of brass to it, and with annatto, to give it the color of copper.

A Cheap Gray Color.—Save all the paint skins and cleanings of paint dishes ; put them into a vessel and keep them wet with oil. When enough has accumulated, heat up and strain through a cloth. If dark, add light for gray ; if light, add dark to please the taste.

Bronze Green.—This may be produced by uniting yellow with black, and working the colors together thoroughly.

Nice Scarlet.—The union of carmine and yellow, but very little of the latter is required.

Deep Blue.—A very little black added to blue will vary its shade to a darker or deeper.

Brown Color.—The union of carmine, yellow and black, will produce a nice brown. Vary the proportions to obtain shade desired.

Pretty Pink.—Carmine, with white added, makes a beautiful pink. As with other pigments, the shade may be varied to please the eye.

Deep Lilac.—Mix ultramarine with white and add sufficient carmine to obtain the required shade.

Lavender Color.—Violet and white mixed and well worked make a very pretty lavender color.

Amber Color.—Add to a pale yellow sufficient carmine to produce the desired effect. By care, it can be made very nice.

Red Brown.—This very popular color, for certain uses, can be produced by the combination of burnt umber and a scarlet lake. But little of the latter is required.

Light Brown.—The union of burnt sienna and lake will produce this shade, or it may be produced by white, red, and a very little black, well worked together.

Salmon Color is a pinkish yellow, and may be made by combination of white burnt sienna and orange chrome. But very little of the latter is required.

PAINT AND STRIPING BRUSHES.

Care of Paint Brushes.—The utility of a paint brush depends very much upon the care it receives. It should never be left standing in the paint for any great length of time, nor allowed to get dry before it is washed. If one is to be used frequently, it may be kept in good condition by allowing the bristles to stand in water or oil, but when the brush is only to be wanted occasionally, it should be washed clean and put away.

Washing Paint Brushes.—Where a brush is not to be washed but once or twice a year, it may be cleaned with soap. Saturate the brush—after getting out all the paint possible—with soft soap, and work the fingers through it thoroughly while immersed in warm, soft water. A little spirits of turpentine may be used to advantage to start the paint from the interior, and after washing, rinse until clean, and draw the brush through the hand to make the bristles lie straight, and when nearly dry loosen up the brush to prevent it drying compact. Very small particles of paint will so cement the fibres or bristles, as to greatly injure, if not entirely destroy, the brush. It is, therefore, important that the work of washing be very thorough.

Where frequently washed, soda should be used, as hot water and soap soften the hairs after a time, and rubbing completes their destruction. Use soda dissolved in cold water. Soda, having an affinity for grease, cleans the brush with very little friction. After well shaking, stand them on the points of the handles in a shady place.

Keeping Paint Brushes.—After washing thoroughly clean, roll the brush up in paper to keep the bristles straight, and when nearly dry, work a little in the hand to prevent packing, and then hang up by a string attached to the handle. Where brushes are to be so frequently used as not to require washing, only as colors are to be changed, those bound with wire should be purchased; cord binding will not stand water well.

Another good way to keep them when not washed is to suspend them by the handles in a covered can, keeping the points at least half an inch from the bottom, and apart from each other. The can should be filled with slow drying varnish up to a line about a sixteenth of an inch above the bristles or hair. The can should then be kept in a close cupboard, or in a box fitted for the purpose.

Wiping Paint Brushes.—Wiping a brush on a sharp edge of tin will gradually split the bristles, cause them to curl backward, and eventually ruin the brush.

How to Bridle a Brush.—To keep a paint brush in good shape, and make it wear for a long time, “bridle” it. This is done by covering the upper



THE BRIDLED BRUSH.

half with leather and stitching it on, or by winding with a cord, as shown in the illustration. The leather should only be drawn tight enough to keep the bristles straight. To keep the leather bridle on, have strings run from four sides and tie around the handle. As the brush wears up, cut away the leather.

Selecting Paint Brushes.—In selecting choose those with long fine bristles, and unless for painting large surfaces, like outbuildings, get small brushes, those a little flattened and not over one and a half inches in diameter. It is difficult to do a nice job on fine work with a large round and heavy brush.

To do good work a good brush is necessary, and one made of Prussian bristles is best. When selecting, see that the handles are not loose, and that the hairs do not come out. Brushes are liable to burst loose from the binding when they are bound with cord, unless the cord is well painted.

Improving New Brushes.—Before using paint brushes they should be placed with the hair end up and some good varnish poured down carefully against the butt end of the handle, which will spread among the hair, and become so hard in a few days that the bristles and handle will be so firmly united as to prevent the bursting of the brush or shedding of hair.

Handles of Paint Brushes.—Flat handled brushes are better than round, for the reason the brush will be used on two sides only, which is the correct way. If a round handle is purchased, it will be an improvement to flatten it.

How to Make a Paint Brush.—Select bristles of uniform length and quality. Those are best which grow on the back of large swine over the shoulders; comb them out clean and straight. A common iron ferrule either round or oblong, should be in readiness, with a handle after common pattern. If the ferrule is round, the handle should be round also. If oblong, the handle flat, with rounded edges. Fill the ferrule with the bristles, the stiff ends extending a little above the ferrule, then part them in the exact center, and put the

handle in point first at soft end, as shown in engraving, and drive it up until it is solid. The end of the handle should come about even with the lower end of the ferrule. If you see the handle is going too loosely, or too tightly, take it out, and remove or add bristles as the case requires.

When the handle is in solid and true, with a sharp knife cut off the projecting bristles around the handle and above the ferrule even. Do not cut quite down to the ferrule and leave a little incline from handle to ferrule. Now coat this surface well with pulverized resin and apply a hot iron. It will melt the resin and



PUTTING IN A BRUSH HANDLE.

sear the bristle ends and make them firm. Give the ferrule and top of brush two coats of red paint, and a very fair brush for coarse work will be ready for use. American bristles are not so good as the Prussian, therefore the home made brush will be inferior to imported ones.

How to Make a Striping Brush.—The best striping brushes are made from camel's hair, but a very good substitute can be manufactured from the long hairs of the squirrel's tail. In selecting, use only those that are perfectly straight. If inclined to curl or wave they are useless. Get different sized quills; comb out the hairs even, make into bunches and wind a spot near roots with fine thread and draw the bunches into the quills from large end to small.

To Clean Striping Brushes.—To clean striping brushes dip in turpentine and wipe out with a cotton rag. Repeat the operation so long as color is shown.

CHEAP PAINTS AND WASHES.

Washes for Dwellings.—I believe as fully as any one in the free use of paints, for the beautifying and preservation of buildings, etc., but cannot indorse the opinion, which is somewhat prevalent, that there is wisdom or economy in the use of cheap materials upon good buildings, especially dwellings. There are no preparations so good as the regular oil paints, made in body of linseed oil, lead and zinc.

Never use cheap washes, those composed chiefly of lime or whiting, upon any valuable building, or one that you at some future time intend to paint with good material, for they will leave the surface in a bad condition for properly coating.

There are many recipes going the rounds of the press which are said to be more durable than oil and lead. Many of them may be valuable, but as to any preparations made up in body of lime being as durable as oil paint, it is simply foolish to talk of it.

Washes for Barns.—I have tried several of the washes for outdoor work, and believe that a liberal use of them upon barns and other outbuildings to be paying investments, for they are applied easily and quickly, making no great expense, and wonderfully improve the appearance of a home, and so rapidly may the wash be put on by any one, that time may be easily given to going over the buildings once a year or two, which is necessary to keep them up in a good state of appearance.

Durable Whitewash.—Add to one peck of white stone lime while it is slaking, one pound of tallow, and two quarts of strong rock-salt brine; thin to proper consistency, and apply with a whitewash brush. The tallow repels moisture, and the salt hardens the lime. The foregoing I know to be good as a wash for outdoor use. This may be made of any color, by adding the common pigments.

Another Formula.—The following is reported to be excellent: Skim milk two quarts, fresh lime eight ounces, oil six ounces, white Burgundy pitch two ounces, Spanish white three pounds. The lime to be slaked in about one fourth of the milk, the oil in which the pitch is to be previously dissolved to be added a little at a time; then the rest of the milk, and afterward the Spanish white.

Glue Wash.—One pound of flour made into common paste, and same amount of glue dissolved, added and boiled; to this add while hot, one and one-half pints of linseed oil, and put the whole with twenty-five pounds of whitening which has been soaked up to proper consistency in water. This is spread the same as common whitewash, but should be a little thicker.

Durable Color Wash.—Take one part fine sand, two parts wood ashes, three parts slaked lime; sift through a fine sieve or screen; mix well, then stir with linseed oil to the consistency of paint; add a little lampblack to darken the color, if wanted. This, for outbuildings, fences, etc., is one of the most durable, as well as the cheapest paints there is. It is also fire proof in all ordinary occasions; is equally good on wood or brick. Apply as other paints are applied, first light, second heavy.

Branard's Paint.—Dissolve ten pounds of shellac in ten gallons of boiling water, adding thirty ounces of saleratus. Mix the solution with an equal quantity of paint prepared in the usual manner. The paint is economical and durable.

Cheap Resin Paint.—The *Scientific American* gives the following: Three hundred parts washed and sieved white sand, forty parts of precipitated chalk, fifty parts of resin, and four parts of linseed oil are mixed and boiled in

an iron kettle, and then one part of oxide of copper and one part of sulphuric acid are added. This mass is applied with an ordinary paint brush while warm. If it is too thick, it is diluted with linseed oil. This paint dries very rapidly and gets very hard, but protects woodwork excellently.

Wash for Brick.—Rosendale cement, three parts, and of fine, clean, sharp sand, one part. Mix thoroughly with clear, fresh water. This will give a granite color, dark or light, according to the color of the cement. If a brick color is desired, add Venetian red to the mixture; or if a very light color is needed, lime may be used with the cement and sand. The walls should be made damp to prevent the brick from absorbing the wash too rapidly. The substance must be stirred frequently during the application and applied with a brush.

Yellow Wash for Buildings.—The Manual of the U. S. Army recommends one pound of copperas in eight gallons of water; let it stand twenty-four hours, stirring it two or three times from the bottom; use this for slaking the lime and thinning it to the consistency of ordinary whitewash. Add hydraulic cement equal in quantity to the lime used, and of clean sand, half a gallon to fifteen gallons of wash. Stir it frequently to prevent the sand from settling.

The walls should be first well cleaned of dust, and thoroughly wet from the nose of a watering pot, and the wash applied (in the usual way) immediately after, beginning at the top, laying on the coat horizontally and finishing it vertically.

Before leaving the work at any time, finish the course to a joint in the wall, to prevent making a mark in the color where the two courses join.

Water Lime Wash.—Mix water lime with milk in small quantities, and apply three or four coats; any dry color may be added. By renewing once in two or three years, a building will look very well. To put this on, the wash should be stirred constantly, as the finer parts will soon be all used out, and at last you will have nothing but sand. Have a boy to stir all the time and mix often.

A Hard Whitewash.—Take a clean, water tight cask, and put into it half a bushel of lime. Slake it by pouring water over it boiling hot, and in sufficient quantity to cover it five inches deep, and stir it briskly until thoroughly slaked. When the lime has been slaked, dissolve in water, and add two pounds of sulphate of zinc and one of common salt. These will cause the wash to harden, and prevent its cracking, which gives an unseemly appearance to the work.

Waterproof Tar Paint.—A writer says that a cheap and useful paint for roofs, walls, fences, outside plastering, etc., may be made by using tar, made thin by spirits of turpentine. Let this be used instead of linseed oil, and to form the body, add fine earthy matter, such as dried clay. For the coarsest kind of work, dry, fine sandy loam may be added as a body. Any of these earthy

bodies, when made sufficiently fine, can be used to good purpose in painting either with the tar mixture or oil.

How to Color a Wash.—Any whitewash, that is, any wash that is white, may be tinted as desired. A cream color may be given to the wash by adding yellow ocher; or a good pearl or lead color by the addition of lampblack. For fawn color, add umber, Indian red and common lampblack. For stone color, add raw umber and lampblack. A pretty peachblow or pink shade may be obtained by adding a little red lead. When washing a building border with a shade darker, when applied to the outside of houses and fences, it is rendered more durable by adding about a pint of sweet milk to a gallon of the wash.

Cheap Inside Paint.—Milk may be used for inside painting, where cheapness is an object, or the house has to be painted while occupied by persons who cannot bear the smell of oil. Take dry lead of any color that is desired, mix with milk, grind, and apply; this will look nearly as well as if painted with oil, and a coat of varnish will make it durable. Whiting, or Spanish white and milk, for ceiling, or milk and lime, make a whitewash that will not rub off.

Lead and Cement Paint.—Mackenzie's method of making a cheap and durable wash for outdoor use, is to take two parts in bulk of water lime ground fine and one part of ground white lead. Mix thoroughly in boiled linseed oil, and then grind all together, either in a paint mill or through a cloth; temper with oil, until it can be spread with a paint brush. It may be made any color. It is said to be very durable, and the ingredients would indicate it to be so.

Brilliant Rice Wash.—Unslaked lime, one peck; slake with hot water; strain and add a quart of rock salt well dissolved, and a pound of rice well cooked and rubbed to a paste. At the same time stir in half a pound of Spanish whiting and half a pound of dissolved glue. This wash should stand a few days after making, and when used, be heated up, well stirred, and applied to the wall hot. It may be used indoors or out.

German Hard Finish.—The following is the German mode for coating wood with a substance as hard as stone: Forty parts chalk, fifty of resin, and four of linseed oil melted together; to this add one part oxide of copper, and afterward one part of sulphuric acid—the last should be added with care. Apply with a brush while hot.

Wash that Won't Rub Off.—The following is recommended. Mix up half a pailful of lime and water; take half a pint of flour and make a starch of it, and pour it into the whitewash while hot. Stir it well and make it ready for use. It is said also, that the addition of a little molasses or melted sugar will make the wash still firmer.

Durable Brown Wash.—A cheap coating for wood, which is very adherent, even when exposed to the weather, consists in simply brushing the

surface with a solution of persulphate of iron of two to two and a half degrees Baume. The blue gray tint which this acquires on drying changes to an agreeable brown when linseed oil varnish is applied.

Coating for Stone.—An English writer says: To render stone and brick walls waterproof, coat them to saturation with a solution of silicate of soda, which is superficially decomposed by the further application of chloride of calcium. The surface thus obtained consists of silicate of lime, which is perfectly insoluble, while it does not alter the appearance of the wall. The experiment is certainly worth trying, as it is a matter of great importance.

Sour Milk Wash.—Good lime, slaked with sour milk, and diluted with water till it is of about the consistency of ordinary whitewash, is recommended by the Landwirth as an excellent coating for woodwork. Fences, rafters, partitions, etc., are, it says, effectually protected against the weather for at least ten years by this application. The caseine of the milk in combination with the lime forms a permanent film, which dries so quickly in warm weather that heavy rains falling directly after it has been laid on will scarcely affect the work.

Soap Paint for Wood.—For a cheap paint for outbuildings, a farmer says, put two gallons of soft, warm water in a vessel holding at least six gallons. Mix thoroughly one gallon of soft soap with the water. Then put in one gallon of raw linseed oil, and mix; lastly, twenty-five to twenty-eight pounds of "mineral paint."

White Vitriol Wash.—A good and cheap wash for outside work may be made by slaking one peck of stone lime, and adding two quarts of sweet milk, half a pound of common salt, and four ounces of white vitriol. The salt and vitriol should be dissolved before they are put in. Thin with water to a proper consistency. Any color or shade of color desired may be given by use of the common pigments.

Wash to Stand Fire.—Woodwork is protected from fire by being painted with a mixture consisting of five parts of alum, seven parts of rye meal paste, and thirty parts of previously washed, *i. e.*, finely divided clay—this mixture is used for woodwork not exposed to the open air—for woodwork, so exposed, a mixture is used consisting of two and a half parts of crystallized sal ammoniac, one part of white vitriol (commercial sulphate of zinc), two parts of joiners' glue, twenty parts of zinc white, and thirty parts of water. These mixtures have been found to prevent wood bursting into flame on ignition, and to greatly delay its destruction even when severe fires are raging.

Compound Mineral Wash.—Make a very thin wash of a peck of lime, then add twenty-five pounds mineral paint, twenty-five pounds whitening, twenty-five pounds road dust, finely sifted. Mix a thick paste with linseed oil, and thin gradually to the proper consistence with sweet buttermilk, fresh from the churn. The covering quality is improved by the addition of half a gallon of soft soap.

Copperas Water Wash.—Dissolve two ounces of well powdered cop-

peras in a gallon of hot water, let it stand a few days, stirring occasionally, then slake stone lime with this, and add to the wash as much water lime as there is of the stone lime, and put in a pint or so of fine sand. This should be well stirred up while being applied. It will be of a yellowish shade, but may be made stone color by adding a little umber or lampblack, deadened by wetting with whisky.

Flax Seed Wash.—Boil for two hours half a pound of flax seed in a pail of water, then strain it into a larger vessel, and put in two quarts common land plaster, same amount of well sifted wood ashes, a teacupful of wheat flour, and a teacupful of salt, previously dissolved. Let the wash stand several days, and stir frequently.

Mixing in Colors.—A correspondent says : Owing to the greasy nature of lampblack, it will not readily mix with the lime wash, but floats on the surface, whence, taken up by the brush, it causes black streaks when applied. To prevent this, proceed as follows : Slake freshly burned lime with just water enough to cause it to fall into dry powder. In this powder stir lampblack until the mass becomes of a uniformly light gray color. Then add boiling water, constantly stirring, until of the proper consistence ; then add yellow ocher and Spanish brown, the former in much the larger quantity.

I need hardly say that all color washes dry much lighter. To prevent the wash from rubbing off, dissolve a teacupful of alum in boiling water, which add to a bucket of wash. To preserve uniformity of tint, the wash should be frequently stirred when used.

WHITEWASHING AND CALCIMINING.

Importance of Whitewash.—No labor connected with such small expense will beautify a home and make it so clean and sweet as whitewashing. Poverty can never be assigned as a true reason for not keeping the walls of rooms white, and the atmosphere sweet, when lime enough to purify a whole house can be obtained for a few pennies. While whitewashing is an easy work to perform, it is a fact that more rooms are purified than beautified by it. A few hints will aid the reader in the work.

How to Apply the Wash.—There is a greater defect in the application of the wash than there is in preparing it for use. Commence washing in the corner of the room ; wet about six feet square of the wall ; apply the brush next to the side wall and sweep out ; never brush both ways when smoothing up ; then extend the strip about six feet further out, apply the brush to the end of the strip and sweep on to the first place washed, and let the brush gradually recede from the wall ; never stop short and remove the brush.

Continue the strip across the room, always setting the brush when finishing up at the end, and sweeping on to that washed before. Continue as the first, until the coat is complete. It is just as essential that the first coating be put on even and without streaks as the last, for all marks left by the brush the first time will show as plainly, or nearly so, as if no more had been added.

When perfectly dry, apply the second coat, but in strips of different widths from the first, so that stripes may not show. If three or more coats are to be put on, cross the stripes each time, *i. e.*, if you wash north and south the first coat, go east and west the second, and the third as at first.

To prevent dropping the wash from the brush upon the floor, wet only one side of the brush at a time and carry it to the wall wet side up.

Preparing Common Whitewash.—Procure white unslaked lime; slake with warm water, by pouring on gradually enough to keep the lime from burning, but not enough to drown it. After it is thoroughly slaked, reduce it to a thin wash so that it is not pasty. If put on too thick it does not penetrate, and after a few coats have been applied it will begin to flake off. If the wall is very rough, mix salt and ashes with the first coat; if smooth, salt only is required. A very little bluing should be put into the last coat to make it a clear white.

Another Formula.—For a good whitewash, mix some fresh slaked lime with water till it is of the consistency of cream; dissolve a small lump of copperas in warm water; when cold, mix with the lime water. Lay it on the walls with a large brush, taking care to stir up the mixture every time the brush is dipped into it.

Whitewashing Smoked Walls.—To prevent the smoke from an old kitchen wall striking through and turning the whitewash yellow, put ten cents' worth of white vitriol—pulverized—in two quarts of cold water; wash the walls with a common whitewash brush dipped in this solution. Let it dry overnight, then apply the following whitewash: Put in a pail the contents of a twenty cent package of white rock lime. Fill the pail with hot water, cover and let steam, stirring occasionally until dissolved. Add to this five cents' worth of painters' blue. This can be applied with an ordinary whitewash brush. It does not rub off, and rivals in whiteness the finest calcimining. Three rooms, twenty-four by sixteen, can be whitened with one twenty cent package.

Paris Whitewash.—Soak one-fourth of a pound of glue overnight, in tepid water. The next day put it into a tin vessel with a quart of water, set the vessel in a kettle of water over the fire, keep it there till it boils, and then stir until the glue is dissolved. Next, put from six to eight pounds of Paris white into another vessel, add hot water and stir until it has the appearance of milk of lime. Add the sizing, stir well, and apply in the ordinary way while still warm.

How to Calcimine.—Calcimining is not much more difficult or expensive than whitewashing. People have generally a different idea, and believe

the work can only be done by professionals. The preparation is about the same as "Paris whitewash," with the addition of coloring material.

To Make the Wash.—Soak the glue overnight, in a tin vessel containing about a quart of warm water. If the calcimine is to be applied the next day, add a pint more of clear water to the glue, and set the vessel containing the glue into a kettle of boiling water over the fire, and continue to stir the glue until it is well dissolved and quite thin. If the glue pail be placed in a kettle of boiling water, the glue will not be scorched. Then, after putting the Paris white into a large water pail, pour on hot water, and stir until the liquid appears like thick milk. Now mingle the glue liquid with the whiting, also the coloring material, and stir thoroughly. Ultramarine makes the best blue. It can be applied with a whitewash or paint brush, as the surface to be covered demands. Spread thin. A thick coat will be likely to crack.

Quantity of Wash.—For a room fifteen by eighteen feet, two coats, take four ounces of good glue and five pounds of plaster Paris, which costs but a few cents per pound. It may be obtained at a paint or drug store. Use hot water to thin the wash, if it does not spread easily.

VARNISH AND VARNISHING.

Buying and Using Varnish.—Do not buy poor material, for it will soon turn to a milky color, which can never be removed. Buy the best turpentine coach varnish; thin it with spirits of turpentine until it can be spread easily with a brush; spread it on light enough so that it will not puddle, and finish up as you go along; never try to smooth up after the varnish has begun to set, which will be in a few seconds after spreading it.

Varnishing Furniture.—Any one can varnish furniture and do it nicely after a little practice, and a few shillings expended in material will add dollars to the appearance of a room. No better investment can be made than to varnish the entire painted woodwork of a room, it will look so much brighter, wear so much longer, and be kept clean so much easier, that after once making a free use of varnish you could not be hired to do without it.

Preparing to Varnish.—Before varnishing furniture or paint, wipe the surface perfectly clean with a moist cloth, and then let it dry. Any places which may have become greasy from handling or otherwise, should be cleaned by using a weak solution of saleratus in water.

To wash any kind of paint, staining or mahogany that has been varnished, for redressing, use as little soap as possible. Take warm soft water, put in just enough hard soap to make a very weak suds, begin at the top and wash

down, and do not wet but a small place before wiping dry with a clean cloth. If there are white spots on the varnish, they can generally be removed by rubbing them with a woolen cloth saturated with a little common coal oil.

Where to Varnish.—Do the work in a warm room, where the atmosphere is dry. In a damp atmosphere the varnish will be very likely to take on a milky appearance. Even on a fine summer day this may happen, and the only way to obviate the difficulty is to heat to seventy-two degrees, sufficient to keep the moisture suspended in the air until the solvent has entirely evaporated, leaving the gums in a thin glossy coat; the brilliancy and defensive value of the varnish will depend upon this. To produce a brilliant surface, prepare the work by washing, if necessary, and drying; leave it in the varnishing room until the wood is of the same temperature of the room, then apply as above directed.

After Varnishing.—After the work is completed, do not touch the varnish with your hands, or allow damp air or dust to blow upon it until perfectly dry. Varnish is not dry until its surface is sufficiently tough to resist insects, dust in currents of air, and is solid to the touch. Don't touch your work with sweaty hands.

Varnish Brushes.—I prefer for domestic use a small, flat brush, one not more than an inch and a half or two inches wide. With a wide brush one unaccustomed to its use is very likely to hit a varnished section while dressing a new place. Never try to use a small, round brush; it cannot be drawn truly over the work, and is too stiff. After finishing a job wipe out the brush as much as possible, wet in alcohol, and wipe until dry, and lay away in a clean place. Washing in turpentine is just about as foolish an operation as any painter can be guilty of; the turpentine will remove all varnish, but it will also stiffen the bristles, and a few washings will destroy the best brush ever made.

Varnish Cup.—If but a little varnish is to be used, a teacup is large enough for a varnish dish, and is easily cleaned. In any event the cups should be small, the largest not holding over a pint; these clean every time after varnishing; in no instance allow varnish to stand in them ten minutes after having varnished the job. If there be any varnish left in the cup, never return to the can, for no matter how careful the varnisher may be, there will be some particles of dust collect in the varnish, either from the air or the brush, most generally the latter. Begin with no more varnish in dish than is expected to do the work, so as to prevent wasting. It is better to refill the dish than to have a surplus to be thrown away.

Crawling Varnish.—Not unfrequently, especially in cold weather, trouble will arise from varnish crawling. The peculiar action comes after the first coat, and is owing to the gloss on the coat beneath it. Just as soon as the gloss is removed the material finds footing, and no more trouble is experienced. Crawling may be easily prevented by washing the under coat with water, and wiping

with wash leather, as this will destroy the brilliancy of the gloss, and, in many cases, the mere dusting with a stiff duster will be found sufficient. As further preventive means, don't keep your varnish in a damp or cold place, or apply a cold varnish on a warm job, or a warm varnish on a cold one.

Varnishing Leaves.—Have a soft brush, and as you dip it in the varnish be careful to take up but little, and press off all that would drop off on the side of your vial or cup. Have plenty of newspapers spread upon your table, and a towel at hand. Cover each leaf upon the right side with a coating of the varnish.

The leaves that you intend to paste into a herbarium, or upon cardboard for pictures, will need but one coat of varnish upon the right side; then you can lay them away upon the newspapers to dry. Be careful that, when drying, each leaf lies single; for if two leaves lap, they will stick so tightly together that you cannot separate them without breaking them.

Then take your larger leaves, and your boughs or bunches of leaves, and varnish and dry them in the same manner; and when, after a week, they are perfectly dry, give them an additional coat of varnish, dry them once more and afterward take any boughs and leaves that you design to use in vases, and give them one coat of varnish upon the wrong side of the leaf, to prevent their curling at the edges. If glued to paper or to a wall, they will not need it.

Precautions in Varnishing Leaves.—Repeated varnishing is not necessary; still it tends to keep the leaves from curling, and makes them more glossy. A large paper box is the best thing to keep them in after they are all varnished and thoroughly dried. Ladies will find it very desirable to use an old pair of kid gloves when varnishing; for although you can remove the varnish from your hands with grease, hot water, soap, and a vigorous rubbing with a piece of pumice stone, yet it will save you much trouble not to get it on. You need newspapers to cover and protect your table, or tablecloth, both when varnishing and pasting and pressing, for it is all untidy work if it is not done with care.

Varnish for Maps.—A good varnish for mechanical and architectural drawing, maps, etc., is obtained by dissolving in one quart of alcohol, one-fourth pound of white shellac, one ounce of camphor, and half an ounce of balsam fir. This varnish dries rapidly.

Another Formula.—A good varnish for maps is made of one ounce Canada balsam and two ounces spirits of turpentine. This is laid on with a soft brush over a thin coating of isinglass previously dried.

To Make Copal Varnish.—To make this varnish, take one pound copal gum, three fourths pound resin; put into one quart of linseed oil and dissolve over a slow fire; boil fifteen minutes, then add two ounces of sugar of lead, and boil fifteen minutes longer, slowly. Reduce to proper consistency with spirits of turpentine.

Another Formula.—Dissolve one part, by weight, of camphor in twelve parts of ether. When the camphor is dissolved, four parts of the best copal resin, previously reduced to an impalpable powder, are added to the ethereal camphor solution and placed in a well stoppered bottle. As soon as the copal appears to be partly dissolved, and has become swollen, four parts of strong alcohol or methylated spirits, and one fourth part of oil of turpentine are added, and after shaking the mixture and letting it stand for a few hours longer, the varnish is obtained.

To Make Tar Varnishes.—These are especially adapted to the preservation of iron, and are made in several ways. One consists in melting pitch in an iron vessel, and when cold, but still fluid, mixing intimately with it heavy tar oil. This varnish will dry in two days. A more quickly drying varnish is made by using tar oil, of a higher boiling point. Fine castings may be varnished with a mixture of similar character, but in which naphtha is substituted for tar oil. This will dry in half an hour.

Black Varnish for Shoes.—Dissolve ten parts by weight of shellac and five of turpentine in forty of strong alcohol, in which fluid should be previously dissolved one part of extract of logwood with some neutral chromate of potassa and sulphate of indigo. The varnish is to be kept in well stoppered bottles.

Varnish for Violins.—Put to one half gallon rectified alcohol, six ounces gum mastic and one-half pint turpentine varnish. Put in a tin case, and keep in a very warm place, shaking often till dissolved. Strain and keep for use. If too thick, add turpentine varnish.

Another Formula.—The recipe for violin varnish as used by German violin makers is four parts sandarac rosin, two parts shellac, one part mastic, two parts benzoes resin, two parts Venetian turpentine, and thirty-two parts of alcohol. The solid ingredients are first dissolved in the alcohol and the Venetian turpentine added afterward, and finally the whole carefully filtered to get rid of all dust. Brushes to be kept scrupulously clean.

Varnish for Boilers.—Some of the machine men say that, the best varnish for the preservation of portable boilers, liable to rust through exposure to outdoor influences, is asphaltum. This substance readily dissolves in turpentine, which forms a good vehicle for its application.

Varnish for Trunks, etc.—Put half a pound of gum shellac, broken up into small pieces, in a quart bottle or jug, cover it with alcohol, cork it tight, and put it on a shelf in a warm place, shake it well several times a day, then add a piece of camphor as large as a hen's egg, shake it again, and add one ounce of lampblack.

If the alcohol is good, it will be all dissolved in three days; then shake and use. If it gets too thick, add alcohol, pour out two or three teaspoonfuls in a saucer, and apply it with a small paint brush. If the materials are all good, it will dry in about five minutes, and will be removed only by wearing it off,

giving a gloss almost equal to patent leather. This may be used for shoes, as it does not soil when touched. It does not harden leather, but resists water and wears well.

A Cheap Common Varnish.—Take of the best raw linseed oil one quart and boil it an hour; then add half a pound of light colored resin, finely powdered, stirring it thoroughly until dissolved; then take it from the fire, and add one-fourth of a pint spirits of turpentine. It should be strained before using and kept from the air, and care should be used in making it, to prevent its taking fire.

Fine Varnish for Wood.—The beautiful varnish applied to clock cases, wooden picture frames and other cheap objects, is in appearance equal to the elaborate finish of the finest furniture, such as pianos, etc. It is made by mixing two pounds of copal varnish with half an ounce of linseed oil varnish. The mixture is shaken often to mix it well, and is then placed on a warm spot. The wood to be varnished is prepared with a thin coat of glue water, dried slowly, and rubbed down with fine pumice stone or something equivalent.

In light colored wood, a light pigment, such as chalk, is added to the glue water; in dark wood, an equally dark pigment is added. When ready, the articles are varnished with the above mixture, and, after drying, rubbed with a solution of wax in ether, thereby acquiring a high polish.

Cheap Varnish for Farm Wagons.—Take of raw linseed oil, sixty parts by weight; litharge, two parts; white vitriol, one part; boil over a slow fire until evaporation ceases; or, boil any quantity of linseed oil for an hour, and to every pound of oil add four ounces of clean resin, powdered; stir it until the resin is dissolved, and then add one ounce of turpentine for every pound of oil; strain it, and when cool it will be fit for use.

Varnishing Water Pails.—If a common wooden pail receives three coats of common copal varnish on the inside before being used, it will never become water soaked, nor will it give any disagreeable flavor to water that may be allowed to stand in it for any length of time.

To Remedy Spongy Varnish.—By the evaporation of the alcohol and the absorption of water, alcoholic varnish often becomes spongy and dull. It is said, that gelatine in narrow strips, put into the varnish, will prevent this. The gelatine will rapidly absorb the water in the varnish.

Varnish for Rough Work.—Any of the ochers or lead, mixed with coal tar, and thinned with turpentine, make an excellent varnish for rough work, and are also a great preserver of wood from damp. Japan will hasten its drying.

Imitation Shellac Varnish.—The following imitation shellac varnish is used by many furniture manufacturers: Gum sandarac, one and one-half pound; pale resin, one and one-half pounds; benzine, two gallons. Dissolve by a gentle heat.

Black Varnish for Handles.—To make a jet black varnish for small wood handles, that will make them smooth and shining, and hard and solid, so that they will not get dim by handling or lose their gloss, take of asphaltum three ounces; boiled oil, four quarts; burnt umber, eight ounces; and enough oil of turpentine to thin. The three first must be mixed by the aid of heat, and the turpentine gradually added—out of doors and away from fire—before the mixture has cooled. The work—dry—is given several coats, each being hardened in a japanner's oven. The last coat may be rubbed down, first, with tripoli applied on a soft cloth, then with a few drops of oil.

Varnish for Glass.—A thin solution of gelatine applied to a plate of glass, which is supported horizontally until dry, makes a good surface for pen and ink drawings for transparencies.

Another Formula.—Terquem prepares a varnish for glass on which drawings can be made, either with India ink or with ordinary ink. Four parts of gum mastic and eight parts sandarac are placed in a well closed bottle with eight parts of ninety-five per cent. alcohol, and warmed on a water bath, then filtered. When used, the glass is heated to 122° to 140°, and the varnish flowed over it. After the drawing is done, it is flowed with a weak solution of gum. The varnish is very hard, and on warm glass it is brilliant and transparent; but when cold it is opaque, and absorbs the ink. It can be employed for putting labels on glass bottles, etc.

Polishing Varnish.—Grind pumice stone to an impalpable powder, moisten a piece of serge with water, and sprinkle on a little of the powder, and lightly rub the surface of the varnish, after which the surface can be polished with fine tripoli and olive oil, applied with a clean woolen cloth. Clean the surface with a soft linen cloth, dust on a little Spanish white, and rub with the palm of the hand.

French Varnish for Hard Wood.—To one pint of alcohol add one-fourth ounce each gum copal, sandarac, and shellac. Let the gums be well bruised and sifted through a piece of muslin. Put the spirits and the gums together in a vessel that can be closely corked; place them near a warm stove, and frequently shake them. In two or three days they will be dissolved; strain the mixture through a piece of muslin, and keep it tight corked for use.

Another Formula.—Scott uses the following: Coal tar, six quarts; black varnish, three quarts; wood tar oil, two quarts; Japanese glue, one quart; red lead, seven pounds; Portland cement, three and a half pounds; arsenic, three and a half pounds. This is only suitable for coarse colored work.

Light Iron Varnish.—Sterling prepares a varnish to protect iron from rust by dissolving gum copal in paraffine oil place the iron in it, and heat it under increased pressure. Iron vessels, tinned inside, which can be hermetically sealed, are heated by superheated steam.

Cheap Oak Varnish.—Clear, pale resin; three and a half pounds, dissolved in one gallon of turpentine.

Transparent Green Varnish.—Grind a small quantity of a peculiar pigment called “Chinese blue,” along with about double the quantity of finely powdered chromate of potash and a sufficient quantity of copal varnish thinned with turpentine. The mixture requires the most elaborate grinding or incorporating of its ingredients, otherwise it will not be transparent, and therefore useless for the purpose for which it is intended.

The color may be varied by an alteration in the proportion of the ingredients: A preponderance of chromate of potash causes a yellowish shade in the green, as might have been expected, and *vice versa* with the blue under the same circumstances. This colored varnish will produce a very striking effect in japanned goods, paper hanging, etc., and can be made very cheap.

Black Varnish for Iron.—A black varnish for iron that will not crack or peel off, is made by adding strong sulphuric acid, drop by drop, to the oil of turpentine, until a sirupy precipitate is formed; wash the whole with clear water until no trace of the acid can be detected in the water, and strain off all the water through a cloth filter.

The precipitate left on the cloth may be used as it is, or a little oil of turpentine may be added to reduce it, in order to cause it to work easier. Immediately after the iron has been painted it must be placed in an oven and dried by a gentle heat. After cooling, the paint should be rubbed with a woollen cloth dipped in linseed oil.

This varnish is claimed to differ from all others in use for iron, as it becomes chemically combined with the metal, and does not wear or crack off like paint.

Varnish for Chromos.—Take Canada balsam two ounces, or spirits of turpentine; mix. Before this composition is applied, the drawing or print should be sized with a solution of isinglass in water. When dry apply the varnish with a camel's hair brush. A piece of isinglass three inches square, dissolved in three or four tablespoonfuls of warm water, is about right.

Try the process on some picture of no consequence, for the isinglass must be strong enough to prevent the varnish from affecting the paper. Pretty colored lithographs may be treated in this manner with a very pleasing effect, particularly landscapes, and if framed, need no glass, which detracts so much from everything except engravings.

When expensive chromos have become soiled, carefully wash them and they will look as fresh as new, after receiving one or two coats of this varnish (without the size of course). If the chromo has become defaced, retouch it with artist's colors.

Varnish for Machinery.—Coal tar has come into general use for coating common iron work black, but for nice machinery a varnish is desired to give a neat and finished look. The following is said to be very superior for

this purpose: Take eight pounds of asphaltum and fuse it in an iron kettle, then add five gallons of boiled linseed oil, one pound of litharge, one-half pound of sulphate of zinc—add these slowly, or it will fume over—and boil them for three hours. Now add one and one-half pounds of dark umber and boil for three hours longer, or until the mass becomes quite thick, when cool, after which it should be thinned with turpentine to proper consistency.

Chinese Varnish.—There is a kind of varnish called *Schio-lias*, which is used by the Chinese for varnishing all kinds of wooden articles, and thus making them water-tight. Even baskets of straw used for the transport of oil, are by means of this varnish made perfectly fit for the purpose. Pasteboard thus varnished becomes in appearance and firmness like wood.

It is made by mixing together three parts of fresh, beaten defibrinated blood, four parts of slaked lime and some alum. A thin, sticky mass is thus obtained, which is immediately ready for use. The Chinese give two coats, or at most three to those articles they wish to make perfectly waterproof.

Transparent Japan Varnish.—Oil turpentine eight ounces, oil lavender six ounces, camphor one dram, bruised copal two ounces.

Varnish for Pictures.—Take of mastic twelve ounces, pure turpentine two ounces and four drams, camphor thirty grains, pounded glass four ounces, oil of turpentine three and a half pints. Let the mastic dissolve with frequent agitation, then, after settling for some hours, pour off the clear part for use.

Another Formula.—It is said that a very nice transparent varnish for pictures may be made by taking the white of an egg, half an ounce of loaf sugar, and beating them up in lime water to a proper consistency for spreading.

Varnish for Oil Paintings.—Take mastic six ounces, pure turpentine one-half ounce, camphor two drams, spirits of turpentine nineteen ounces; add first the camphor to the turpentine. The mixture is made in a water bath; when the solution is affected, add the mastic and the spirits of turpentine near the end of the operation, and filter through a common cloth.

Another Formula.—Take some clean parchment cuttings, boil them in water in a clean glazed crock till they produce a very clear size, strain it and keep it for use. Give your work two coats of the above size, passing quickly over the work, not to disturb the colors; when dry, proceed as before directed with your varnish.

Solvent for Shellac.—Dr. Walz gives the following method for obtaining a neutral solution of shellac in water: The shellac is broken up and covered with a concentrated solution of carbonate of ammonia, and boiled upon the water bath until the ammoniacal smell has disappeared.

More of the solution is added, and the boiling is continued until the shellac forms a coherent, sponge-like mass; the carbonate of ammonia is then expelled by further boiling, and the mass will readily dissolve by pouring boiling water

upon it. A kind of soap will be found floating on the surface, which may readily be removed by straining.

The solution, spread on paper, cloth, etc., dries rapidly and leaves a thin, lustrous and adherent film of shellac behind.

PUTTY AND PUTTYING.

Spanish Whiting Putty.—"Putty makes good joints," is an old saying, but not always true. It is affected by the expansion of both wood and iron. Heat expands iron, and a nail or screw head will lift putty out of place, and moisture so expands wood as to injure the appearance of a smooth finish.

The use of putty being absolutely indispensable, pains should be taken to use nothing but the best. Some parties depend upon buying what they want, getting it at a lower figure than they could make it, but it is a much poorer article than should be used on important work. Commonly, the commercial putty is made of Spanish whiting and linseed oil, but lead is much better.

How to Make Lead Putty.—An old painter gives the following, which he claims will never shrink or swell after it becomes dry. "Take a quantity of the best dry lead and mash it up fine on the paint stone, lay aside about one-half of the dry lead and mix the remaining half with enough brown japan to make a soft mass, then roll and work enough of the dry lead to bring it up to the required thickness, and afterward pound it with a heavy broad faced hammer until every lump has disappeared and the putty becomes soft and pliable. There is no danger of pounding it too much.

"After it is well pounded, procure a tub of soft water, and holding the putty in the hands, knead it in the water from ten to fifteen minutes, and afterward work it out of the water for a few minutes, and a superior quality of putty will be produced."

To Color Putty.—If putty is to be colored, the coloring matter should be moistened in oil before mixing with the putty; it should then be well kneaded in order to become thoroughly incorporated.

Filling Nail Holes.—The reason that nail holes, after being filled with putty, become unsightly by the putty lifting up, is because the grains of the wood are crushed down, and when the wood gets dampened, the grains swell partially back to place, and lift the putty. To remedy this, wet the wood around the nail head after it has been punched in; this will cause the broken fibers of wood to expand, and make all detached portions assume their former position. After the wood becomes dry, sand paper off and paint at least two coats before puttying.

Puttying Up Cracks.—When puttying cracks in wood, first oil and paint, getting the wood well saturated, so that moisture will not find place. To make the putty hard and adhesive, mix with hot glue. Use immediately after uniting the two.

Putty for Hurried Work.—There is a formula for making a quick putty in case one has not time to allow the ordinary article to dry. To powdered pure white lead add a small quantity of lampblack to render it gray, red to make it red, etc., and gold size (English drier) to moisten. It is sufficient to mix these ingredients together without grinding them. This putty must only be made in such quantities as may be required for immediate use, as it dries fast, even under the hand when in use.

Ten minutes after being applied it will be ready for pumicing, which, however, must be performed lightly. It may even be smoothed by using a rag and powdered pumice stone.

Substitute for Putty.—Mix plaster of Paris and water to the consistency of thick cream. It should be prepared in small quantities, and applied immediately, for it quickly hardens. Brush the sash or frame over with water before applying the plaster. For repairing broken windows, it answers very well.

To Soften Lump Putty.—People often experience much trouble in softening hard balls of putty, and by such, the following plan is worthy of trial: Break the putty into lumps of the size of a hen's egg; add a small portion of linseed oil, and water sufficient to cover the putty; boil this in an iron vessel for about ten minutes, and stir it when hot. The oil will mix with the putty. Then pour the water off, and the putty will, I am informed, be as soft as if freshly made.

To Soften Old Putty.—A paste of caustic potassa made by mixing the caustic alkali or even carbonate of potash or soda with equal parts of freshly burnt quicklime which has previously been sprinkled with water, will be found of value to soften putty around window panes, to be removed when the former has become hard by age.

Another Method.—If soft soap is made into a paste with a solution of caustic potash or soda, and the mixture is laid on with an old brush or rag, putty or paint will become in a few hours so soft that it may be removed with ease.

To Remove Old Putty.—Many persons destroy their window sashes endeavoring to remove old putty. This may be obviated by applying a hot poker to the putty, which will then readily yield to the knife, and leave the sash clean.

Imperishable Putty.—Take ten parts of Spanish whiting and one part of white lead, and mix them with the necessary quantity of boiled linseed oil, adding a small amount of the best sweet oil. This last prevents the white lead from hardening, and preserves the putty a long time. All putty should be

made some time before it is used; and sashes intended to be puttied should previously receive one coat of paint, which will cause the putty to adhere much more firmly.

Flint Putty.—Mix common white lead putty with gold size, and you will have a putty which will become as hard as flint, and will take a very smooth surface.

How to Keep Putty.—Do not keep putty in a paper or cloth, as the oil will be absorbed by capillary attraction, and the putty become hard and worthless. Oil silk or a bladder is best to keep putty in. A sheet of paper, saturated with linseed oil, will answer in absence of something better.

Mending Tin with Putty.—If tin ware can be spared long enough for putty to dry, holes may be permanently stopped with that material, but I prefer solder when it is convenient to use it. It certainly looks more workmanlike.

Smoothing Down Putty.—The best way to smooth down putty after it has been applied to work, is to use a clean, thin blade, and rub with a firm pressure. A case or dinner knife answers a very good purpose in the absence of a regular putty blade.

To Make a Putty Knife.—When putty is to be applied to window sash, the material cannot be put on in a finished style without a regular putty knife. A very good substitute for a boughten one may be made from an old



SHAPE OF PUTTY KNIFE END.

table blade by cutting the end, as illustrated, with a cold chisel, and then grinding it smooth. This knife will be found convenient for use in the application and smoothing down of putty in various places. When finishing a job, rub the blade upon a piece of wood or other hard substance until perfectly clean.

GLUES AND GLUING.

Hot Glue.—In every family there should be some sort of a glue pot and a good quality of glue ready for any necessary repairs. For wood I much prefer the hot material to any liquid glue.

Selecting Glue.—Choose that which has a clear, transparent look, free from clouds or spots, and of a reddish-yellow cast, without bad taste or smell.

The quality of glue may be very well determined before using, by putting a piece in cold water, for that which is good will swell, but not dissolve. Good glue will only become soluble in water when heated nearly to a boiling point.

Another very good test at the time of purchase is to whittle with a jack knife. Simply cut the edge of a piece. If the material cuts like horn, rolling up a hard, elastic shaving, it is good, but if it cuts brittle it is not cheap at any price. Good glue, when in the cake, is always crisp, and will bear but little bending when perfectly dry, but snap violently. If it has a rotten break it is not good. In purchasing glue, therefore, select it in dry weather. If it is soft at that time it is best to not take it.

Pure glue possesses a much better body and will require double the amount of water to reduce it to a proper consistency for use; it will also retain its adhesive qualities, so as to form fine filaments when dropping from the brush, while poor glue will drop in even drops like water.

Condition of Glue.—Burnt glue is always weak. If kept dry, glue may be preserved for any length of time, but when moist it soon spoils. No more glue should be prepared at any one time than is to be used immediately, and whenever a job requiring extra strength is to be executed, it will always pay to prepare a fresh pot. The hotter the glue the better the joint. In all large and long joints it should be applied immediately after boiling. Employ pressure until it is set or hardened. The clamp on page 20 should be used wherever possible.

The Glue Kettle.—Glue cannot be handily or well prepared by setting the vessel that contains it directly upon the stove. It is liable to burn, and furthermore, will cook down too rapidly and become unfit for use in a short time. Where one vessel sits in another containing hot water, trouble often arises from incrustation of glue, reaching half an inch thick sometimes, near the top of the dish.

Three or four small holes should be drilled in the side of the kettle close to the top rim. The kettle being set into the boiler, the steam arising from the water surrounding the kettle passes through the holes and keeps the interior of the kettle above the surface of the glue constantly moist.

The glue which drips from the brush will, therefore, run down and reunite with the mass, instead of hardening and adhering to the sides, and the kettle is thus kept clean, however much used. The holes should be confined to one-half, or two-thirds of the kettle, in order that a place may be left at which to pour out the glue when desired.

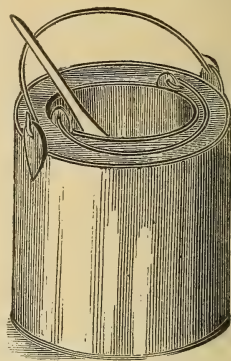
A cheap and very simple glue pot may be made by using a tin cup that will set down into and rest upon the top of a common tea kettle. A still cheaper arrangement is to set an old tea cup in a basin of boiling water, and dissolve the glue in the cup.

A common round fruit can, with a couple of ears soldered on for bail and a

little cup fitted into the opening, all of which will be done by a tinner for a few cents, makes a good glue kettle, as shown in illustration. It is not absolutely necessary to have a bail on the small cup, as that is not to be lifted out for use.

The water should be poured out and the can dried after using, especially if only brought into occasional service. Wash the glue from the cup and dry that also, so as to have each batch fresh and strong.

Preparing Glue.—To prepare glue as it should be, more care than skill is required. Break the cakes up into small pieces, apply a little blood warm water, and allow the glue to dissolve slowly. After it is melted or softened, set the glue cup into hot water, and stir the substance, and add hot water until it is all dissolved and reduced to the consistency of thin molasses. There is no danger of overheating glue when the cup is in water, but if the cup is set on the stove it may be easily spoiled.



THE GLUE KETTLE.

Applying Glue.—In the application of glue it should be remembered that the thinner the layer which is applied the stronger will be the joint, and the less water there is combined with the glue the sooner will it dry, and consequently the less will the joint be exposed to accidental disturbance before union has fairly occurred. Moreover, it is necessary that the glue be brought into immediate contact with the entire surface of the wood. The glue should be well rubbed in with a brush and the two surfaces should be rubbed well together, and retained in contact under great pressure until the glue has become dry and hard. Complete dryness rarely takes place under several days; but after the lapse of twelve hours the joint becomes tolerably strong. A joint made in this way is probably as strong as can be made by any ordinary process.

Glue not Adhesive.—The conditions under which glue does not hold firmly are: First, when the glue is poor or stale; second, when the surfaces to which it is applied are greasy or dirty; third, when the glue is cold; fourth, when the surfaces are not pressed together with sufficient force; fifth, when the glue is not well rubbed into contact with the surface.

Liquid, or Prepared Glue.—There are several formulas for making glue, but none of them so good for wood as the hot glue, with no addition but water. A little nitric acid will prevent the glue from gelatinizing or becoming solid, and the further addition of a little vinegar will prevent it from moulding. Some add sulphate or chloride of zinc to common glue for the purpose of keeping it liquid.

Whisky Glue.—Crack up the glue and put it in a bottle; add to it common whisky; shake up, cork tight, and in three or four days it can be used,

It requires no heating ; will keep for almost any length of time, and it is at all times ready to use, except in the coldest weather, when it will require warming. It must be kept tight, so that the whisky will not evaporate. The usual cork stopper should not be used. If too much alcohol be used, the glue separates from the water and falls to the vessel in the form of a white, viscid substance.

Vinegar Glue.—By dissolving common glue in vinegar, a very good article is made of what is called “prepared glue.” Make it about the consistency of mucilage ; when it becomes too thick reduce with vinegar, or dissolve common cabinet glue in strong hot vinegar, three parts, and alcohol one part, with the addition of a little alum. Keep it in a bottle, well corked, and any broken article about the house may be quickly and firmly mended.

Sugar of Lime Glue.—This may be prepared by dissolving three parts of glue, broken into small pieces, in twelve to fifteen parts of saccharate of lime. On warming, the glue dissolves rapidly, and remains liquid when cold, without losing its strength. Any desirable consistency may be secured by varying the amount of saccharate of lime.

Aquafortis Glue.—A liquid glue may be made by dissolving thirty-three parts of best glue on the steam bath in a porcelain vessel, in thirty-six parts of water. Then add gradually, stirring constantly, three parts of aquafortis, or enough to prevent the glue hardening when cool.

Compound Glue.—An adhesive substance called compound glue is made from flour, albumen, or white of an egg and yeast mixed together, and well worked until of the proper consistency to roll and pound. After being well worked with gum water on even tin plates, and dried in a stove, cut in cakes for use. To color, tinge the glue with vermilion for red ; indigo for blue ; saffron for yellow.

Another Formula.—Take common glue in very small or thin bits, and isinglass glue ; infuse them in as much alcohol as will cover them for at least twenty-four hours. Then melt the whole together, and, while they are over the fire, add as much powdered chalk as will render them an opaque white. This is said to make a very strong glue.

Isinglass Portable Glue.—Dissolve beaten isinglass in water by boiling, and having strained it through a coarse linen cloth, evaporate it again to such a consistence that, being cold, the glue will be perfectly hard and dry. A great improvement is made by adding a little alcohol or brandy.

Another Formula.—Take one pound of the best glue, boil and strain it very clear ; boil likewise four ounces of isinglass, put it in a double glue pot with one half pound of fine brown sugar, and boil it pretty thick ; then pour it into molds ; when cold, cut in small pieces and dry them. This glue is very useful to draughtsmen, architects, etc., as it immediately dilutes in warm water, and fastens the paper without the process of dampening.

Marine Glue.—This adhesive compound is composed of four parts (by

weight) of India rubber cut into shreds and dissolved in thirty-four parts of coal oil, to which is added sixty-two parts of shellac in powder. The whole is heated, in order to obtain a homogeneous mixture, after which it is poured out so as to form cakes when solid.

When required for use, it is heated in an iron vessel, and applied hot, with a brush, to the surfaces of wood which are required to be united, and these are then screwed up till the glue is cold and dry. Articles cemented with this compound resist the action of water much better than when united with common glue.

Another Formula.—Mix together gum sandarac, one-fourth pound; gum mastic, one-fourth pound, and methylated spirit, eight pounds. When the gums are dissolved, add one-half pound of turpentine, and mix this with a thick, hot solution of the best glue (to which a little isinglass has been added to clarify it), and filter through muslin.

Elastic Sweet Glue.—Good common glue is dissolved in water, on the water bath, and the water evaporated down to a mass of thick consistency, to which a quantity of glycerine, equal in weight with the glue, is added, after which the heating is continued until all the water has been driven off, when the mass is poured out into molds or on a marble slab.

This mixture answers for stamps, printers' rollers, galvano-plastic copies, and so forth. The sweet glue, for ready use by moistening with the tongue, is made in the same way, substituting, however, the same quantity of powdered sugar for the glycerine.

Glue for Damp Atmosphere.—A glue for fastening labels on preserve bottles may be made by macerating five parts of good glue in from eighteen to twenty parts of water for a day, and then adding to the liquid nine parts of sugar candy and three parts of gum arabic.

The mixture can be brushed upon paper while lukewarm; it keeps well, does not stick together, and when moistened adheres firmly to bottles. For labels to be used in places subject to damp, it is well to prepare a paste of good flour and glue, to which linseed oil, varnish and turpentine have been added, in the proportion of half an ounce each to the pound. Labels prepared in the latter way do not fall off in damp places.

Glue for Polished Steel.—A Turkish receipt for a cement used to fasten diamonds and other precious stones to metallic surfaces, and which is said to strongly unite even surfaces of polished steel, although exposed to moisture, is as follows:

Dissolve five or six bits of gum mastic, each of the size of a large pea, in as much alcohol as will suffice to render it liquid. In another vessel, dissolve in brandy as much isinglass, previously softened in water, as will make a two-ounce vial of strong glue, adding two small bits of gum ammoniac, which must be rubbed until dissolved. Then mix the whole with heat. Keep in a vial closely stopped. When it is to be used, set the vial in boiling water.

Waterproof Glue.—One ounce of gum sandarac and one ounce of mastic are to be dissolved together in a pint of alcohol, to which an ounce of white turpentine is to be added. At the same time a very thick glue is to be kept ready, mixed with a little isinglass. The solution of resins in alcohol is to be heated to boiling in a glue pot, and the glue added gradually with constant stirring, so as to render the whole mass homogeneous.

After the mixture is strained through a cloth, it is ready for use, and is to be applied hot. It dries quickly and becomes very hard, and surfaces of wood united by it do not separate when immersed in water.

Flexible Glue.—A German chemist has discovered that if glue or gelatine be mixed with about one-quarter of its weight of glycerine, it loses its brittleness, and becomes useful for many purposes, for which it is otherwise unfit, such as dressing leather, giving elasticity to porcelain parchment or enamel paper, and for bookbinding.

Shellac for Gluing.—A solution of shellac and alcohol has been used and highly extolled as a substitute for common glue. It forms a tolerable liquid cement, but is far inferior to glue. Any of the common recipes will afford a liquid glue which will answer well enough for purposes where no great strength is required; but we know of no cement which is more convenient than common glue, and yet which will unite wood with anything like the efficiency of that article.

Insoluble Glue.—Ordinary glue can be rendered insoluble by water, by adding to the water with which glue is mixed, when required for use, a small quantity of bichromate of potash, and exposing the articles to which it is applied to the light. Chromic acid has the property of rendering glue or gelatine insoluble; and as the operation of heating the glue pot is conducted in the light, no special exposure of the pieces joined is necessary.

Fire-proof Glue.—To make a glue for resisting fire, proceed as follows: Mix a handful of quicklime in four ounces of linseed oil; boil to a good thickness, then spread on plates in the shade, and it will become exceedingly hard, but may easily be dissolved over the fire, and used as ordinary glue. It resists fire after having been used in gluing substances together.

Heat in Gluing.—If glue is applied to wood, and the wood is left cold, it will immediately chill the glue, and a film will form that will prevent the glue from striking into the wood. If, on the other hand, the wood is hot, the process of cooling is necessarily slow, and the full strength of the glue is obtained. Where the parts are so located as to make it impossible to heat, set a block of wood upon the stove or by the fire until thoroughly heated, and apply the block with clamps.

Japanese Rice Glue.—A glue, very elegant and strong, is made by the Japanese out of rice. They simply boil it in water and work it into a fine paste. It is said to be very beautiful, snow white, almost transparent, and that pa-

pers pasted together with it will separate in their own substances before the glue will give way. This article is very useful to ladies when making nice, white paper boxes and other articles for ornamental purposes.

Second Gluing.—When a piece of furniture has been previously repaired with glue, and the joint has proved defective, if it be wished to repeat the operation, the old glue must be all carefully removed by soaking and scraping. The surfaces must then be warmed, dried, and treated as on the first application.

Clamp in Gluing.—Always put a clamp on your work wherever you can, for although the glue will adhere of itself to the wood, it adheres much more strongly if pressed down by that appliance. See "Clamp," page 20. Also, never put a veneer on a piece of work that is uneven, for although it may set square under the pressure of the clamp, when you come to scrape it, it will yield to the inequalities, and when varnished and polished, will be full of depressions.

To Keep Glue.—To prevent glue becoming sour and moldy, make an addition of a quantity of carbonate of soda, just sufficient to give a strong smell to the glue. This will accomplish the desired result, it is said.

Glue for Emery.—To fasten emery to leather, boil glue very thin; add a little milk, raise the pile of the leather, and put on the glue with a brush. Then sprinkle on the emery and let it cool.

White Glue.—To make a good cement for wood with a light color, dissolve best white glue in a sufficient quantity of hot, strong acetic acid or vinegar.

Glue for Metal.—To stick leather, paper, or wood to metal, to a gill of glue dissolved in water, add a tablespoonful of glycerine.

Separating Glued Parts.—To remove a glued part from another, as a dowel entering an auger hole, wind a wet rag around the piece for twelve or twenty-four hours. Then hold firmly and give a few sharp raps. If the parts do not separate, apply hot water by means of a cloth.

POLISHES AND POLISHING.

German Furniture Polish.—The Germans and French have a way of polishing furniture not much in use here. First, the surface of the wood is evenly ground with fine sand paper and then with pumice stone and linseed oil; then a tampon is made of cotton, covered with flannel, and on the top of this a piece of fine linen is fixed.

In this tampon there is soaked about a teaspoonful of solution of shellac in alcohol, and one drop of linseed oil placed on top, and then the furniture is

rubbed till, by the drying of the varnish during the rubbing an exceedingly fine polish is obtained. This operation is repeated two or three times. Occasionally some pure alcohol is placed on the tampon.

Wax Furniture Polish.—Take beeswax and turpentine, one ounce of the former to half a pint of the latter; put the turpentine in a tin basin and cut the beeswax in small pieces and put in, then put in the oven when not very hot, so it (the wax) will gradually melt; stir constantly.

Apply to the furniture with a piece of woolen rag (a piece of broadcloth is best for the purpose) and have another piece to rub with. The rubbing should be vigorous. An old silk handkerchief may be used to advantage to finish up with.

Tripoli Furniture Polish.—Take two ounces of tripoli, powdered; put it into an earthen pot, with just enough water to cover it; then take a piece of white flannel, lay it over a piece of cork or rubber, and proceed to polish the varnish, always wetting it with the tripoli and water.

It will be known when the process is finished, by wiping a part of the work with a sponge, and observing whether there is a fair, even gloss. When this is the case, take a bit of mutton suet and fine flour, and clean the work. The above process is suitable to other varnished surfaces.

Common Furniture Polish.—Make a mixture of three parts of linseed oil and one part spirits of turpentine. It not only covers the disfigured surface, but restores the wood to its original color and leaves a luster upon the surface. Put on a light coat with a piece of cloth and rub with woolen. Equal proportions of turpentine, linseed oil and vinegar, thoroughly applied and then rubbed with flannel, is also good.

Polish for Oiled Furniture.—The black walnut tables on sewing machines may be kept nice by rubbing with a cloth moistened lightly with kerosene oil. Try it on any other piece of oiled furniture, and you will quickly see an improvement. Do not use it on varnished articles.

Polish for Mahogany.—Take half a pint of rectified naphtha and add two and a half ounces of shellac; put it in a bottle in a warm place, and when dissolved, it is ready for use. It works well with a brush.

For Cherry Furniture.—To dress up cherry furniture, take linseed oil, put it into a glazed crock with as much alkanet root as it will cover. Let it boil gently, and it will become of a strong, red color; when cool it will be fit for use.

Black Walnut Polish.—Take asphaltum, pulverize it, place it in a jar or bottle, pour over it about twice its bulk of turpentine or benzole, put it in a warm place, and shake it from time to time. When dissolved, strain it and apply it to the wood with a cloth or stiff brush. If it should make too dark a stain, thin it with turpentine or benzole. This will dry in a few hours.

If it is desired to bring out the grain still more, apply a mixture of boiled oil

and turpentine; this is better than oil alone. Put no oil with the asphaltum mixture, or it will dry very slowly. When the oil is dry, the wood can be polished with the following: Shellac varnish, of the usual consistency, two parts; boiled oil one part. Shake it well before using. Apply it to the wood by putting a few drops on a cloth, and rubbing briskly on the wood for a few minutes. The polish works well on old varnished furniture.

To Polish Bare Wood.—Take a piece of pumice stone and water, and pass regularly over the work until the rising of the grain is cut down; then take powdered tripoli and boiled linseed oil, and polish the work to a bright surface.

To Apply French Polish to Wood.—The wood must be placed level, and sand-papered until it is quite smooth, otherwise it will not polish. Then provide a rubber of cloth, list or sponge, wrap it in a soft rag, so as to leave a handle at the back for your hand, shake the bottle against the rubber, and in the middle of the varnish on the rag place with your finger a little raw linseed oil. Now commence rubbing in small circular strokes, and continue until the pores are filled, charging the rubber with varnish and oil as required, until the whole wood has had one coat.

When dry, repeat the process once or twice, until the surface appears even and fine, between each coat using fine sand paper to smooth down all irregularities. Lastly, use a clean rubber with a little strong alcohol only, which will remove the oil and the cloudiness it causes, when the work will be complete.

How to Polish Wood Carvings.—Take a piece of wadding, soft and pliable, and drop a few drops of white or transparent polish, or French polish, according to the color of the wood. Now wrap the wet wadding up in a piece of old linen, forming it into a pad; hold the pad by the surplus linen; touch the pad with one or two drops of linseed oil. Now pass the pad gently over the parts to be polished, working it round in small circles, occasionally re-wetting the wadding in polish, and the pad with a drop or so of oil.

The object of the oil is merely to cause the pad to run over the wood easily without sticking, therefore as little as possible should be used, as it tends to deaden the polish to a certain extent. When a carving is to be polished after having been varnished, the same process is necessary, but it can only be applied to the plainer portions of the work. Plain surfaces must be made perfectly smooth with glass paper before polishing, as every scratch or mark will show twice as badly after the operation.

When the polish is first rubbed on the wood, it is called the "bodying in;" it will sink into the wood and not give much glaze. It must, when dry, have another body rubbed on, and a third generally finishes it; but if not, the operation must be repeated.

Just before the task is completed, greasy smears will show themselves; these will disappear by continuing the gentle rubbing without oiling the pad. You

should now be able to see your face in the wood, at least so says the *Cabinet Maker*.

How to Polish Marble.—First smooth it by rubbing over it a piece of level surface cast iron or a brick well supplied with water and sand, renewing the sand by a finer kind and then by emery, until a very smooth surface is procured. Then polish with putty powder—oxide of tin—and water rubbed on with a piece of tightly rolled wool felt—a strip of an old hat—used endwise. Lastly, wash with water and dry with a soft linen cloth.

Polish for Patent Leather.—Whites of two eggs, one tablespoonful of spirits of wine, two large lumps of sugar, finely powdered ivory black, as much as may be sufficient to produce the necessary blackness and consistence. To be laid on with a soft sponge lightly, and afterward gently rubbed with a soft cloth.

Waxing and Polishing Floors.—For waxing wooden floors the following preparation is recommended: Dissolve three ounces of potash and four drams of catechu in four pounds of boiling water in an earthen pot. When these ingredients are dissolved, add two pounds of water, and boil again, stirring in four and a half ounces of yellow wax with a wooden rod. Continue boiling until all the lumps of wax disappear. Let it cool, and add three pounds more of water. In this condition it is ready for use.

By boiling the wax and potash together a soluble wax soap is formed, so that a floor waxed with this preparation may be swept, but cannot be washed with water, for that would dissolve the soluble wax soap. For this reason an oil paint is preferable to wax polish, the only advantage of the latter being that it dries quickly, while oil paints require a long time, during which the room cannot be used.

To Polish Painted Floors.—After the floor has been painted, in order to give it a polish and make the surface more permanent, it is coated with what is called “floor lac,” which may be made thus:

Dissolve one ounce of shellac in one-fourth of a pound of eighty per cent. spirits, and add to the solution one dram of camphor, and strain out the lees in a linen cloth. This lac is used after the paint is dry, and gives more tenacity to the surface. A fresh coat of lac may be applied from time to time, as it wears off, and you have always a fine polished surface, which can be washed.

Black Polish for Iron.—To obtain that beautiful deep black polish on iron or steel which is so much sought after, it is required to boil one part of sulphur in ten parts of oil of turpentine, the product of which is a brown sulphuric oil of disagreeable smell. This should be put on the outside as lightly as possible, and heated over a spirit lamp till the required black polish is obtained.

To Protect Polished Iron.—To keep polished iron work from rusting in salt air, coat it with mercurial ointment, or, what answers nearly as well,

with a mixture of mutton tallow (free from salt) and white lead applied in a melted state. When the machinery is to be used the coating can be removed by slightly warming the metal.

White Brightness for Iron.—The following method for brightening iron is recommended by Boden: The articles to be brightened are, when taken from the forge or the rolls, in the case of such articles as plate, wire, etc., placed in dilute sulphuric acid (1 to 20), where they remain for about an hour. This has the effect of cleansing them, and they are washed clean with water and dried with sawdust. They are then dipped for about a second in commercial nitrous acid, washed carefully, dried in sawdust, and rubbed clean.

It is said that iron goods thus treated acquire, without undergoing any of the usual polishing operation, a bright surface having a white glance. Care should be taken by any one using the nitrous acid not to inhale its fumes.

Simple Iron Polish.—Rods in grates, and other polished irons, may be renewed by simply taking a piece of flannel dipped in coal oil and touched to emery, finely powdered, and rubbing the part briskly.

To Polish Britannia.—Wash the ware every time it is used, in hot suds of fine soap, rinse with boiling water, and dry while hot with a soft towel. Once each week rub the metal with wash leather and a very little whiting.

To Polish Brass Ornaments Inlaid in Wood.—File the brass very clean with a smooth file; then take some tripoli powdered very fine, and mix it with the linseed oil. Dip in this a rubber of felt, with which polish the work until the desired effect is obtained.

If the work is ebony, or black rosewood, take some elder coal powdered very fine, and apply it dry after you have done with the tripoli, and it will produce a superior polish.

To Make Metal Polishes.—Pulverize a pound of chalk in two quarts of water—the water should be filtered—let it stand two minutes; in this time the gritty matter will have settled to the bottom; pour the water into another vessel slowly, so as not to stir up the settlings; let it stand until entirely settled and then pour it off as before. The settlings in the second vessel will be your prepared chalk, ready for use as soon as dried.

Spanish whiting treated in the same way makes a very good cleaning or polishing powder. Some operatives add a little jeweler's rouge, which is a decided improvement. In cases where a sharp polishing powder is required, it may be prepared in the same way from rotten stone.

Polish for Clothes Boxes.—Camphorated oil is highly recommended as a polish for certain uses. This is simply sweet oil in which gum camphor is dissolved. The camphor serves the additional purpose of driving away moths.

To Polish a Gold Chain.—Put the chain in a small glass bottle, with water, a little tooth-powder and some soap. Cork the bottle, and shake it for a minute violently. The friction against the glass polishes the gold, and the

soap and chalk extract every particle of grease and dirt from the interstices of a chain of the most intricate pattern. Rinse it in clear, cold water, wipe with a towel, and the polish will surprise you.

To Preserve Polish on Plate.—Among the minor annoyances of housekeeping is the one that, however carefully plate may be cleaned before putting it away, in the course of a week or so it becomes dull and tarnished. This may be avoided by the following simple means: After thoroughly cleansing the plate and polishing it with whiting, wrap up each piece in tin-foil, such as is used for wrapping up chocolate, tea, etc.; then put it in a dry cupboard or drawer, and at the end of many years the plate will be as bright as the first day it was packed.

Polish for Stoves.—Black lead, well mixed with white of egg, is a good stove blacking. Lay on with a paint brush, and when dry polish with a hard brush.

Commercial stove luster, when mixed with turpentine and applied in the usual manner, is blacker, more glossy, and more durable than when mixed with any other liquid. The turpentine prevents rust, and when put on an old rusty stove will make it look as well as new.

It is said that if stove polish is mixed with very strong soapsuds, the luster appears immediately, and the dust of the polish does not fly around as it usually does. Cold tea is better than clear water or vinegar for mixing luster, at least so far as odor goes.

SOLDER AND SOLDERING.

Tools and Material for Soldering.—Soldering is not such a difficult job as some people imagine, and the reason that repairing done at home to tin ware has such an unfinished look is because good materials are not used, and the operator does not go at the job in the right way.

In the first place, the outfit, which is not expensive, should consist of some common solder, a small soldering iron—copper—a vial of prepared muriatic acid, a small alcohol lamp and a lump of resin.

To Make Solder.—Solder can be obtained at any tin shop, but if desired to make it at home, melt together two parts lead and one of bar tin, and you have the common solder.

Soldering with a Lamp.—When a hole appears in a tin pan, scrape the surface bright with a knife, sprinkle on a little finely powdered resin, lay on a bit of solder and hold it over the spirit lamp until the solder melts, and it will flow over the fracture and make a complete job. If the pan is old, rusty or

greasy, use the muriatic acid in place of the resin. I like it rather the best under all circumstances, yet resin works well enough when the tin is new.

To Solder with the Iron.—Where a large fracture is made, scrape bright, use acid or resin and apply the solder with the “iron.” Here is where one great defect comes in; the copper is not “silvered” and soon loses its attractive power and will not lift the solder, but can be easily remedied and kept in complete order. When the surface gets blackened, file the four sides until they are bright, and then rub them upon a smooth board while hot in a mixture of resin and solder; the “silvering” will soon be effected. When the iron is taken from the fire wipe it on a damp cloth before attempting to use it to lift the metal with.

To Make Soldering Liquid.—The zinc solution is made by putting some muriatic acid, say two ounces, in a wide mouthed bottle, with twice as much water; add to this some strips of sheet zinc, and when the acid has dissolved all the zinc it will, which will be known by the stopping of the effervescence, it is ready for use. This is best done in the open air, as the gas given off during the operation smells unpleasantly.

The Fire for Soldering.—The soldering iron is best heated in charcoal, or the coals of a wood fire; if a hard coal fire is used, more care is required. The copper should never get red hot, as in that case the coating of the point will be burned off, and it must be retinned. Remember that the metal to be soldered must be heated by the contact before the solder will unite with it and flow.

It is well to practice first on some bits of tin, as an unskilled hand may heat the utensil too much, and thus unsolder parts already joined.

To Make Solder Drops.—Heat the solder just enough to melt it and no more, then pour it in a steady stream of about an eighth of an inch in diameter from a height of two or three inches, into cold water.

To Make Very Soft Solder.—Soft solder that will melt quickly at a low temperature over an ordinary candle or lamp, and that can be used for mending tinware, can be made of pure lead and tin, one part each.

To Make Brazing Solder.—Ordinary brass is mixed or melted with one-sixth its weight of zinc. Pour out of the crucible, cool, and granulate by crushing with a hammer.

Alloy for Soldering Steel.—An alloy suited for soldering steel and iron to brass, is made of three parts tin, thirty-nine and a half copper, and seven and a half zinc. It is stated by Dr. Dingler that, by this alloy in a molten state, steel and iron, as well as copper and brass, can be so joined together as to prevent any breakage. Before it is applied, all the metals to be joined together must be heated to the same temperature as the alloy.

To Make Soldering Wire.—Make a few holes in the bottom of a ladle with an awl; then pour into the ladle the melted solder, moving the ladle at the

time, allowing the stream to fall upon an old saw blade, or something of the kind. A little practice will make one efficient. The size of the wire may be varied by moving the ladle fast or slow.

Another Method.—A simple form of making wire and drops is given by a correspondent of the *Scientific American*. He says he has made solder for his own use for many years, by the following simple process : Take a sheet of stiff writing or drawing paper, roll it in a conical form, exactly like the cornucopias sold by confectioners, but broader in proportion to its length. Make a ring of stiff wire to hold it in, attaching a suitable handle to the ring. The point of the cone may be cut off to leave an orifice of the proper dimensions for the slow flow of the metal.

When filled with molten solder, it is held just above the surface of a pail of cold water, the stream of solder flowing from it will congeal in the shape of a wire. If held a little higher, so that the stream will break into drops before striking the water, it will form elongated "tears" of metal.

By holding it still higher, each drop forms a thin concave cup or shell. As each of these forms has its peculiar use, he has found this simple instrument invaluable. A few experiments will convince any one that he can prepare solder in any convenient form by the aid of a sheet of paper and a bucket of cold water.

To Solder German Silver.—Pour out some spirits of salt in an earthenware dish, and add a piece of zinc. Then scrape clean the edges to be soldered and paint over with the spirit of salt. Apply a piece of pewter solder to the point and melt with the blowpipe.

Solder for Steam Valves—The following solder will braze steel, and may be found very useful in case of a valve stem or other light portion breaking, when it is important that the engine should continue work for some time longer : Silver nineteen parts, copper one part, brass two parts. If practicable, charcoal dust should be strewn over the melted metal of the crucible.

Soldering with Tin.—In many cases, good work may be done without the soldering iron, by filling or turning the joints so that they fit closely ; moistening them with soldering fluid ; placing a piece of smooth tin-foil between them ; tying them together with binding wire, and heating the whole in a lamp or fire till the tin-foil melts.

I have often joined pieces of brass in this way so that the joints were quite invisible.

Hard Solder.—This substance is made by melting together two parts of copper to one of tin.

Gold Solder.—For fine work a solder is made of twenty-four parts gold, two parts of silver and one part of copper.

Silver Solder.—To make a hard solder use four parts of silver to one of copper. To make a soft solder, use two parts of silver to one of brass wire,

HOW TO TIE KNOTS.

The Weaver's Knot.—A very effectual knot for fastening the ends of strings together, so that they will not slip, is shown in the illustration. It is tied by crossing the ends of the strings between the balls of the left hand thumb and finger, the one running down to the right, below the other. Now



THE WEAVER'S KNOT.

carry right hand string in a circle around the joint of the thumb, beneath its own end, and back between the crossed string ends. Now bend the left string end down through the loop, catch it under the thumb, holding firmly, and draw the right hand string till a hard knot is made.

To Tie a Safety Knot.—To make a safety knot as represented in cut, take the fixed or standing part of the rope in the left hand, lay the free end over it, and then by a twist of the wrist make a loop in the standing part which shall



THE SAFETY KNOT.

inclose the free end, then carry the free end behind the standing part and through the loop, parallel with itself.

To Tie the Flat Knot.—This knot, shown in drawing, is well adapted for common use. It is neat, flat, does not readily slip, and is easily untied. It is the same as is used in tying shoe-strings and neck-ties, except that the ends



THE FLAT KNOT.

are drawn through. It is essential that the two parts of each string should be on the same side,

The Double Loop Hitch.—To make this form two loops as shown in figure 1, then bend the rope between them, bringing the loops together, and



THE DOUBLE LOOP—1.



DOUBLE LOOP HITCH—2.

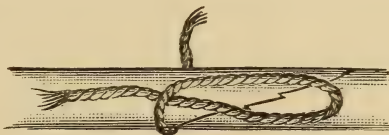
drop them over a post as in figure 2. This is very handy for hoisting or temporary fastening to a post.

The Single Bowline Knot.—This is a knot particularly adapted to heavy and hard ropes. It is used by sailors for dock anchorage. It will hold



SINGLE BOWLINE KNOT.

an immense pressure and loosen readily again. Its formation is shown in accompanying illustration.



THE BINDING KNOT BEGUN.

The Binding Knot.—In the illustration herewith, is shown a very effectual knot for binding a breakage or splice, and finishing with both ends of



THE BINDING KNOT FORMED.

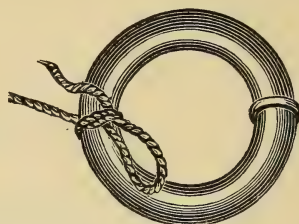
the cord held firmly down. As will be seen, the first loop is made longer than the space to be bound. When the winding is finished, slip the cord

through the loop and then pull on the loop end, or free string, until the other is drawn down beneath the clasping cord.

The Half Hitch Knot.—The two illustrations show the formation of a half hitch knot, which differs but little from the common bow knot. No. 2 shows its application. It may be used in various ways; among the most im-



SINGLE HALF HITCH KNOT.—1.



HALF HITCH KNOT APPLIED.—2.

portant may be mentioned the tying down of cork bottles. When it is reversed it becomes a running knot. To form the knot, take the rope or cord in the left hand and make a loop, then in the right hand make a second loop, and put this through the first and pull on the main part of the rope, or that part in the left hand. It may be quickly made, and will be found very useful for common application.

CEMENTS AND CEMENTING.

Value of Cements.—Cements of most kinds are of simple formula, inexpensive and highly profitable in use. The price of this book may be saved several times over by an ordinary family in a single year, if necessary repairs are properly and promptly attended to, by the use of cements given herein. The following is a very complete list of the most valuable adhesive compounds, and the most of them I have tested and found to be all that can be desired.

Application of Cement.—It must be remembered that application has much to do with the accomplishment of the desired object. The best cement ever discovered may appear to be valueless, from bad management. All cements that are used in a fused state, that is, melted or warmed up for application, should be applied to warm surfaces, for chilling the substance before thorough adhesion has taken place, makes the job a failure. Really, the parts brought together should be heated to a temperature equal to the adhesive substance.

Sealing Wax Cement.—This will unite glass or china quite firmly, if the parts are heated sufficiently to melt the wax, and then kept firmly together until cold. But sealing wax will not adhere at all to these substances if melted

and applied to the cold parts. The same may be said in the use of shellac. This appears to be the most difficult point to bear in mind, and there are thousands of people who buy and use cements and call them worthless, just because they do not use them properly. The following hints should always be observed.

Hints for Cementing.—First, properly prepare the cement. If to be fused for use, warm the article to be repaired. Second, do not use but little of the material. When broken parts are closely brought together, there is but very little space for cement, and that very little is much better than more, for the molecules bind the two broken parts together, but if the two parts are separated a little, the space is filled by a sheet of cement, which is not a hard substance of itself, and this soft line gives way. Third, have the parts clean—perfectly clean, when the cement is applied. Fourth, pressure upon the two parts is of the utmost importance, for the complete seclusion of air. So long as the space between the fractured parts is filled with air, there can be no effectual adhesion.

Shellac Cement.—Melt the shellac, and apply while hot to heated broken parts, and hold them firmly together until the gum is cold. This is not adapted to flexible objects and will not stand heat, as that softens the cement, or alcohol, as this gum is soluble in that liquid.

White Lead Cement.—For mending crockery and other such articles so that they will stand heat and water, nothing is better than simply pure white lead, or zinc-white, ground in oil, and used very thick, but it takes a very long time to harden sufficiently.

The best plan is to place the mended object in some store room, and not to look after it for several weeks, or even months. After that time it will be found so firmly united that, if ever again broken, it will not part on the line of the former fracture. For articles desired for immediate use, white lead is not adapted.

Rice Flour Cement.—A very convenient cement can be made from that simple substance, rice flour. Mix the rice flour well with cold water and let it gently simmer over a fire, and it will form a nice and lasting white cement which will answer all purposes of common paste, and is also excellent in uniting paper cards, etc., in the many useful and ornamental styles which ladies like to adopt in such employments. When made of the consistence of plaster clay, models, busts, etc., may be formed of it, and these articles when dry can be made to retain polish and are very durable.

Mastic Cement.—According to Bottger, these cements are mixtures of one hundred parts of sand, limestone and litharge (yellow protoxide of lead) with seven parts of linseed oil. At first the mixture has little coherence, but when pressed, it gradually acquires the hardness of ordinary sand stone.

Waterproof Cement.—Take half a pint each of good vinegar and sweet milk; mix, and after it has stood awhile, separate the curd from the whey, and

to the latter add the whites of five eggs, and after beating well together sift into this a sufficient quantity of quicklime to make a thick paste. Broken plates and other dishes mended with this cement will stand both fire and water. It should be used as soon as prepared.

Litharge Cement.—For cementing small tanks the best material is, perhaps, composed of equal measures of litharge, sand and plaster of Paris, made into a paste with boiled linseed oil.

Clay Cement.—A cement to resist great heat or boiling water may be made as follows: To four or five parts of clay, thoroughly dried and pulverized, add two parts of fine iron filings free from oxide, one part of peroxide of manganese, one-half of common salt, and one-half of borax; mingle thoroughly; render as fine as possible; then reduce to a thick paste with the necessary quantity of water, mixing well. It must be used immediately.

After application, it should be exposed to warmth, gradually increasing almost to a white heat. This cement is very hard, and presents complete resistance alike to a red heat and boiling water.

Another Formula.—Clay well dried and powdered to a fine dust, then mixed with boiled linseed oil. This cement has the claim of lasting for years.

Dry Cement.—A dry cement, which is recommended as resisting weather equal to stone, is made of two parts of sifted ashes, three parts clay, and one part sand, mixed with oil. This must be used before it begins to harden.

Chinese Cement.—The Chinese make a paste out of quicklime and the blood of a bullock, using one pound of lime to ten of blood. It becomes a stiff jelly, and may be kept in this state and beaten down with an addition of water, to a proper consistency, when wanted for use.

Lime Cement.—A very cheap and good cement for filling cracks in wood where unsightly may be made as follows: Moisten a piece of recently burnt lime with enough water to make it fall into powder; mix one part of the slaked lime with two parts of rye flour, and a sufficient quantity of boiled linseed oil to form a thick, plastic mass.

Acid Proof Cement.—A cement that is acid proof is made with a concentrated solution of silicate of soda, formed into a paste with powdered glass. This simple mixture is said to be invaluable in the operations of the laboratory where a luting is required to resist the action of acid fumes.

Another Formula.—Take one part pitch, one part resin, and one part of plaster of Paris. Melt together the first two, then add the plaster and mix thoroughly. The ingredients must be perfectly dry to get the desired result.

Gelatine Cement.—The following is a valuable cement, which, if properly applied, will be insoluble even in boiling water: Gelatine, five parts, soluble acid chromate of lime one part. Cover the broken edges with this, press lightly together and expose to the sunlight; the effect of the latter being to render the compound insoluble.

Alum and Plaster.—These two materials mixed make a very good cement for common use. The better way is to make a strong alum water, and wet the plaster of Paris with it to the proper consistency.

Cement for Leakages.—Beat yellow soap and whiting with a little water, into a thick paste. Rub this over the part where the leakage is, and it will be instantly stopped.

Cement for Amber.—A solution of hard copal in pure ether, of the consistency of castor-oil, is suggested by Rust for cementing amber. The carefully cleaned surfaces of fractures, coated with the solution, should be pressed together, and retained in contact by means of a string wound round the object, or in some other suitable way.

The operation should be performed as rapidly as possible, since the evaporation of the ether impairs the adhesiveness of the cement; so that all arrangements for compressing the object should be made before laying on the cement. A few days are required for the complete hardening of it. In repairing tubes, as for pipes, any of the solution happening to pass into the interior should be carefully removed at once with a slender feather.

White Cements.—In addition to the use of white lead, zinc paint, and rice flour as white cements, the following is given: For large objects, bees-wax, one ounce; resin, four ounces; powdered plaster of Paris, five ounces. Melt the first two together and then add the plaster, mixing thoroughly. Warm the edges of the articles to be united and apply the cement warm. Second: Dissolve seventy-five parts of India rubber in sixty parts of chloroform or benzine, and add to the solution fifteen parts of mastic. This cement will be very nearly transparent. Third: Make a very strong solution of gum arabic in water, and stir into it plaster of Paris until the mixture becomes of the proper consistency. Warm the edges of your china and apply the cement; press firmly together. Let it stand three days, when it will be solid.

Elastic Cement.—Ordinary collodion is made by mixing eight parts of gun cotton with one hundred and twenty-five parts of ether and eight parts of alcohol. When used as a cement it becomes very hard, cracks easily, and peels off. It may be rendered elastic by the addition of four parts of Venetian turpentine and two parts of castor oil.

When intended for surgical purposes, as a varnish, which, when dry, forms a perfectly close fitting plaster, it has been found that the addition of some glycerine to the ordinary collodion, in which it is dissolved to a small extent, makes a varnish which adheres strongly to the skin, does not crack, and on account of its elasticity, does not crease the skin.

Hard Cement.—A cement which becomes excessively hard in time may be prepared by mixing two parts of silica, one part of silicate of alumina, and nine or ten parts of carbonate of lime, all in powder, and then roasting in a

puddling furnace. The remaining mass is then to be ground and again roasted with two or three parts of carbonate of baryta.

In practice, very pure sand will answer for the silica and chalk for the carbonate of lime, the remaining ingredients being supplied by natural carbonate of baryta.

Red Lead Cement.—Red lead and white lead mixed equal parts with boiled linseed oil to the proper consistency, make a very good cement for using upon material of pink color.

Cement for Marble.—Sift plaster of Paris through muslin, and mix it with shellac dissolved in alcohol or naphtha. As soon as mixed apply quickly and squeeze out as much of the composition as possible, wiping off that which squeezes out before it sets.

The cement will hold better if the parts to be joined are roughened by a pointed tool before cementing. This can be done without breaking off the edges of the fractured parts. Plaster of Paris used with white of egg also makes a good cement, but it must be used with expedition.

Cement for Cloth.—The following is said to be an excellent method of fastening cloth to the tops of tables, desks, etc.: Make a mixture of two and one-fourth pounds of wheat flour, two tablespoonfuls of powdered resin, and two tablespoonfuls of powdered alum; rub the mixture in a suitable vessel, with water, to a uniform, smooth paste; transfer this to a small kettle over a fire, and stir until the paste is perfectly homogeneous without lumps.

As soon as the mass has become so stiff that the spoon will remain upright in it, transfer it to another vessel and cover it up so that no skin may form on its surface. This cement, applied in a very thin layer to the surface of the table, the cloth, or leather, is then laid and pressed upon it, and smoothed with a roller. The ends are cut off after drying.

Storm Cement.—Three bushels of clean sand, mingled with half a bushel of good lime and half a bushel of cement, make an excellent mortar, which is not liable to be dislodged by storms. Or a good out of door cement may be made of three bushels of coal ashes, mixed with two of gas lime, and made into stiff mortar with gas tar, spread on a level bed of small stones, well rammed down, produce a good pavement for a stable floor.

Cement for Knife Handles.—A good cement, for fastening blades of dinner-knives in ivory handles, consists of resin four parts, beeswax one part, plaster of Paris or brick dust one part. Fill the hole in the handle with the cement, heat the tang of the blade, then press it in. Pulverized resin is sometimes used alone, but the combination is better.

Another Formula.—One pound of colophony (purchasable at the druggists) and eight ounces of sulphur, which are to be melted together and either kept in bars or reduced to powder. One quart of the powder is to be mixed with half a quart of iron filings, fine sand or brick dust, and the cavity of the handle

is then filled with this mixture. The stem of the knife or fork is then to be heated and inserted into the cavity; and when cold it will be found fixed in its place with great tenacity.

Roof Cement.—Four parts of coal tar, one of air slaked stone or shell lime and one of hydraulic cement or water lime. The cost of the materials is about three or four cents per gallon—a quantity sufficient for a large roof costing only a trifle. Pour the tar into an iron pot over a slow fire, and when moderately hot, sift in the lime and the cement. Stir and mix well. Apply it warm. A second coat will be well, to make sure the covering of all the leaky cracks and to increase its durability. To improve the color and utility, sift on a coat of white or yellow dry sand soon, or about as fast as it is put on, as it soon becomes hard.

Cement for Silk.—For uniting sheet gutta percha to silk or other fabrics: gutta percha, forty pounds; caoutchouc, three pounds; shellac, three pounds; Canada balsam or Venice turpentine, fourteen pounds; liquid styrax, thirty-five pounds; gum mastic, four pounds; oxide of lead, one pound.

In making the cement the Venice turpentine should be first heated; then the gutta percha and the shellac should be added; the order in which the other materials are added is not important. Care should be taken to thoroughly incorporate them, and the heat should be cautiously regulated so as not to burn the mixture. Any desired quantity, of course, can be made by using materials in same proportions.

Pitch Cement.—Melt together in an iron pan two parts of common pitch and one of gutta percha, stirring them until thoroughly incorporated, and then pour the liquid into cold water. When cold, it is black, solid, and elastic; but it softens with heat, and at 100° Fahr. is a thin fluid. It may be used as a soft paste or in a liquid state, and answers an excellent purpose in cementing metal, glass, porcelain, ivory, etc. It may be used instead of putty in glazing windows.

Cement for Jewels.—The jewelers in Turkey ornament watch cases and other trinkets with gems, by gluing them on. The stone is set in silver or gold, and the back of the setting made flat to correspond with the part to which it is to be applied. It is then fixed on with the following cement:

Isinglass, soaked in water till it swells up and becomes soft, is dissolved in French brandy or rum, so as to form a strong glue; two small bits of gum galbanum, or gum ammoniacum, are dissolved in two ounces of this by trituration, and five or six bits of mastic as big as pears, being dissolved in as much alcohol as will render them fluid, are to be mixed with this by means of a gentle heat.

This cement is to be kept in a bottle, closely stopped; and when used, it is to be liquefied by immersing the vial in hot water. This cement resists moisture.

Aquarium Cement.—In addition to those cements given in this department that are insoluble in water, I add the following: Make a mixture of a solution of eight ounces of strong glue and one ounce of varnish, one of linseed oil, or three quarters of an ounce of Venice turpentine, which are to be boiled together, agitating all the time, until the mixture becomes as complete as possible. The pieces to be cemented ought to be kept in conjunction for forty-eight or sixty hours.

Second Formula.—One part (measure) of litharge, one part plaster of Paris, one part fine beach sand, one third of powdered resin (fine); mix well. This will keep for years if corked in a bottle; when used, make in a putty with boiled linseed oil.

Third Formula.—Take two parts of white lead, one part of red lead, one part litharge; then with boiled linseed oil mix to the proper thickness. This cement is particularly adapted for use upon cloth. Coat a piece of flannel with it, and paste it into a corner of the aquarium, or wherever there is a leakage.

Fourth Formula.—A very powerful cement is composed in the proportion of two ounces of sal ammoniac, and four ounces of sulphur, made into a stiff paste with a little water. When the cement is wanted for use, dissolve a portion of the paste in water, rendered slightly acid, and add a quantity of iron turnings or filings, sifted or powdered, to render the particles of uniform size. This mixture will, in a short time, become as hard as stone.

Fifth Formula.—If clay and oxide of iron be mixed with oil, according to Mr. Gad, of Stockholm, they will form a cement that will harden under water.

Cheese Lime Cement.—To make this, the curds of milk are mixed with lime—equal parts. A similar compound is formed of cheese and lime mixed with water or skim milk. This is used in England by some mechanics as a putty for joiners' work, and as a material for molding. It is known as cheese lime.

Gasfitters' Cement.—Take five pounds of resin, one pound of beeswax, one pound of red ocher and one fourth pound of plaster of Paris. Mix thoroughly. Fine brick dust may take the place of plaster and ocher.

To Cement Tortoise Shells.—Provide a pair of pincers, the tongs of which will reach four inches beyond the rivet. Now file the tortoise shell clean to a lap joint, carefully observing that there be no grease about it. Wet the joint with water; apply the pincers hot, following them with water, and the shell will be found to be joined, as if it were originally one piece.

Cement for Lamps.—Where the brass tops of lamps have become loosened, it is not commonly considered a very easy job to secure them firmly in place again. Plaster of Paris is used more than any other one material, but that is so porous and so quickly becomes penetrated by the oil, that it loses its adhesive power. The following has been extensively used, and, if rightly made and applied, will not disappoint the one who employs it.

Boil three parts of resin with one part of caustic soda and five parts of water, which, if mixed with one half its weight of plaster of Paris, will make a cement which is not permeable by petroleum ; it sets firmly in a short time and is not a good conductor of heat.

Cement for Stone.—The combination of red and white lead with boiled linseed oil and litharge, make a good cement for joining stones of any size. It should be used by dressing a strip of thin cloth on each side and placing this between the parts to be joined. The stone should be warmed, if possible. This cement will resist boiling water. As to proportions, there is no regular formula. To dry quickly, red lead should be used in greater proportions. If there is no hurry, white lead should be used in excess. I prefer the white lead when ample time can be given for drying. Equal parts of oil and litharge may be used.

Another Formula.—Seven or eight parts of resin and one of beeswax, melted together, and mixed with a small quantity of plaster of Paris, is a very good cement to unite pieces of stone. The stone should be made hot enough to melt the cement, and the pieces should be pressed together as closely as possible, so as to leave as little as may be of the cement between them. This is a general rule in cementing, as the thinner the strata of cement interposed, the firmer it will hold.

Still Another Formula.—There is a preparation called cheese cement which is insoluble in water, but so much trouble is required to make it that it is not much used. The cheese should be that of skimmed milk, cut into slices, throwing away the rind, and boiled till it becomes a strong glue, which, however, does not dissolve in the water. This water being poured off, it is to be washed in cold water, and then kneaded in warm water. This process is to be repeated several times. The glue is then to be put warm on a levigating stone, and kneaded with quicklime. This cement may be used cold, but it is better to warm it ; and it will join marble, stone, or earthenware, so that the joining is scarcely to be discovered.

Cement for Hones.—This is made of common cabinet glue melted with half its weight of resin and the addition of a little red ochre to give it a body. This is particularly useful for cementing hones to their frames in new work, or when they have become loosened, if well cleaned before applying the material.

Cement for Leather.—Of the many substances lately brought very conspicuously to notice for fastening pieces of leather together, and in mending harness, joining machinery belting, and mending shoes, one of the best is made by mixing ten parts of sulphide of carbon with one of oil of turpentine, and then adding enough gutta percha to make a tough, thickly-flowing liquid.

One essential prerequisite to a thorough union of the parts, consists in freedom of the surface to be joined from grease. This may be accomplished by laying a cloth upon them and applying a hot iron for a time. The cement is

then applied to both pieces, the surfaces brought in contact, and pressure applied until the joint is dry.

Water-proof Cement for Leather.—I am told that a good water-proof cement or glue, for holding wood or leather, may be made by dissolving fine shreds of India rubber in warm copal varnish. The material to be united should be made clean, and be perfectly dry at the time of applying the cement.

Cement for Belting.—A cement for leather belting: Common glue and isinglass, equal parts, soaked for ten hours in just enough water to cover them; bring gradually to a boiling heat and add pure tannin until the whole becomes ropy, or appears like the white of eggs. Buff off the surfaces to be joined, apply this cement, and clamp firmly.

Another Formula.—Take of common glue and American isinglass, equal parts; place them in a boiler, and add water sufficient to just cover the whole. Let it soak ten hours, then bring to a boiling heat, and add pure tannin until the whole becomes ropy or appears like the white of eggs. Apply it warm. Buff the grain of the leather where it is to be cemented; rub the joint surfaces solidly together, let it dry a few hours, and it is ready for practical use; and if properly put together, it will not need riveting.

Sulphide of Carbon Cement.—A good material for cementing leather is made of ten parts sulphide of carbon, one part of oil of turpentine with enough gutta percha to make a thick, flowing liquid. It should be remembered that leather filled with grease cannot be cemented as it should be, and where the parts to be united contain oil, trim them well, fold a cloth over them, and apply a hot iron for a short time, then apply the cement to both parts, and press together until entirely dry.

Heat-proof Leather Cement.—A leather cement may be made which will stand both heat and alcohol: Take the best kind of glue; pour on an equal quantity of water; let it soak overnight; next morning melt it over a gentle heat, and add fine Paris white, or white lead; mix well, and add a little acetic acid, carbolic acid, oil of cloves, or any other ethereal oil, to prevent putrefaction. This cement is well adapted for flexible objects. It will not withstand boiling water well, as this softens the glue.

White Glue Leather Cement.—Prepare a solution of two hundred parts of white glue in water; another one of fifty parts of isinglass; three of gum arabic, and three of tragacanth; and finally, another of one part of bleached shellac in alcohol. Then pour these three solutions together, mix them with twenty-four parts of white lead, and, at the last, twelve parts of the best glycerine, and two hundred parts of alcohol. The mastic thus obtained should be immediately put up in bottles and well corked.

Gutta Percha Cement for Leather.—A good gutta percha cement is made by dissolving gutta percha in chloroform in quantity to make a fluid of honey-like consistency. When spread it will dry in a few minutes. Heat the

surface at a fire or gas flame until softened, and apply them together. Small patches of leather can be thus cemented on boots, etc., so as almost to defy detection, and shoemakers employ it with great success for this purpose. It is water-proof, and will answer almost everywhere, unless exposed to heat, which softens it.

Cement for Rubber.—A cement, made by dissolving rubber cut fine in benzine, may be used to mend rubber boots and shoes. This cement will firmly fasten on the rubber patch. Put the pieces of rubber in a wide mouthed bottle and fill it about half full of the purest benzine; the rubber will swell up almost immediately, and if well shaken will, in a few days, assume the consistency of honey.

If the rubber does not dissolve add more benzine. If, when dissolved, the cement is too thin, add more gum. A piece of rubber one inch in diameter will make a pint of cement. This dries in a few minutes and is very useful in uniting pieces of leather, as it is both elastic and durable.

Another Formula.—Powdered shellac is softened in ten times its weight of strong water of ammonia, whereby a transparent mass is obtained, which becomes fluid after keeping some little time without the use of hot water. In three or four weeks the mixture is perfectly liquid, and, when applied, it will be found to soften the rubber.

As soon as the ammonia evaporates the rubber hardens again—it is said quite firmly—and thus becomes impervious both to gases and to liquids. For cementing sheet rubber, or rubber material in any shape, to metal, glass and other smooth surfaces, the cement is highly recommended.

As rubber plates and rings are nowadays almost exclusively used for making connections between steam and other pipes and apparatus, much annoyance is often experienced by the impossibility or imperfectness of an air tight connection. This is obviated entirely by employing the above.

Marine Cement for Glass.—To cement glass letters, a thick solution of marine glue in good naphtha will answer if color is no object. But the glass must be chemically clean, and this is not always easy. The least trace of soap or grease will spoil the adhesion of any cement. Try soda or ammonia, following by whiting and water, clean cloths, and plenty of rubbing, and let the cement dry on the letters till the surface just begins to be "tacky" before you apply them.

Balsam of Fir Cement for Glass.—This makes a very good cement when not exposed to heat. It is to be warmed and applied to the glass, previously warmed. It is used for cementing lenses, mounting microscopic objects, etc., and does very well for broken glass which is not to be washed in warm water. The thicker the balsam the stronger; when too thin, it may be thickened by gentle evaporation.

Gum Arabic Cement for Glass.—If to a strong solution of gum

arabic, measuring eight and one-half fluid oz., a solution of thirty grains sulphate of aluminum, dissolved, two-thirds ounce of water be added, a very strong mucilage is formed, capable of fastening porcelain or glass.

Kourie Cement for Glass.—A gum has been introduced into the trade, obtained from trees in New Zealand ; it is called kourie, and has been found to be a most excellent, strong and water-proof cement for calking tanks and cementing pieces of glass, stone or wood together. Before using, it is fused and mixed with one-third part of its weight of castor oil.

Glycerine Cement for Glass.—A cement for bottle tops, that will keep the most volatile liquids from evaporating, may be made by mixing finely ground litharge and concentrated glycerine. It dries quickly, becomes very hard, and is easily removed with a knife. Glycerine also mixed with gelatine imparts to it many useful qualities. It answers well to hermetically seal bottles. It will solidify on cooling, without losing its ductility.

Diamond Cement.—Isinglass one ounce, distilled vinegar five and a half ounces, spirits of wine two ounces, gum ammoniacum half an ounce, gum mastic half an ounce. Mix well.

Alcohol Cement for Glass.—Dissolve shellac in alcohol and evaporate until a paste is formed as thick as honey. Apply to the broken edges of glass with a fine brush. This will do for common usage, but not for glass table ware, as the shellac will dissolve in warm water.

Tumbler Cement.—For cracked or broken tumblers white lead is as good as anything, provided they are to be used simply for storage of jellies, etc. They should be repaired long enough in advance to allow time for thoroughly drying.

Caseine Cement for Glass.—A cement to stop cracks in glass vessels, which will resist moisture and heat, is made by dissolving caseine in a cold saturated solution of borax. With this solution paste strips of hog's or bullock's bladder, softened in water, on the cracks of glass, and dry at a gentle heat. If the vessel is to be heated, coat the bladder on the outside, before it has become quite dry, with a paste of a rather concentrated solution of soda and quicklime or plaster of Paris.

Hot Cement for Glass.—To cement glass, cut three parts of good India rubber into small shreds ; dissolve it by agitation in thirty-four parts of cold naphtha. Add to this sixty-four parts of shellac in fine powder, and heat the whole, with constant stirring, until the shellac is dissolved. Then pour it while hot on metal plates, to form sheets. When required for use, heat to 250 degrees Fah., and apply quickly, or dissolve seventy-five parts India rubber in sixty parts of chloroform or benzine, and add to the solution fifteen parts of mastic.

Bottle Cement.—When a cement is to answer only a temporary purpose, as for instance in making the corks or stoppers of bottles perfectly air and

vapor tight, it will not do to employ a kind which becomes very hard, as is the case with oil and lead compounds, nor again, other kinds, such as wax and resin, which are softened by many chemical vapors. The best cement in such cases is red lead, or finely powdered litharge mixed with undiluted glycerine. This hardens soon enough, and when required, can be easily removed.

Another Formula.—Resin fifteen parts, tallow four (or wax three) parts, highly dried red ocher six parts, or lampblack sufficient to give color.

Cements for Iron Pipes.—A cement for closing joints in iron pipes may be made by taking of coarsely powdered iron borings, five pounds; sal ammoniac, two ounces; sulphur, one ounce, and water sufficient to moisten and mix. The cement hardens quickly with the sulphur in, but not so firmly as when left out. If time can be spared, it is better to use the iron and sal ammoniac alone. It should be used in any case as soon as mixed and pounded firmly into the crack.

Cements for Iron and Stone.—Glycerine and litharge stirred to a paste hardens rapidly, and makes a suitable cement for iron upon iron, for two stone surfaces, and especially for fastening iron to stone. The cement is insoluble, and is not attacked by strong acids.

A preparation varying from this has been used for years by M. Pollac, of Bantzen, Saxony. He has employed the cement made of pure oxide of lead, litharge and glycerine in concentrated state. He has used it to fasten the different portions of a fly wheel with great success; while, when placed between stones and once hardened, it is easier to break the stone than the joint.

Fire-proof Iron Cement.—A cement for filling up cracks and holes in stoves is finely pulverized binoxide of magnesia, mixed with a strong solution of silicate of soda (water clay), so it forms a thick paste; fill the cracks and heat the stove slowly.

Cement for Stoves.—Wood ashes and common salt, wet with water, will stop the crack of a stove.

Cement for Steam Pipe Joints.—Take white lead, ground in oil, a sufficient quantity. Add dry red lead enough to make a stiff putty. Put the mass in a mortar or on a block of iron or smooth stone, and pound it till it becomes soft; continue to add red lead and pound until the mass will no longer become softer by pounding, nor stick to the fingers. At this time it should be of sufficient tenacity to stretch out three or four inches when pulled, without parting.

The more protracted the pounding, the softer, finer, and more tenacious the cement becomes. Interpose this putty between the flanges of the steam pipe joints, taking care to put a thin grommet of packing or wicking around the diameter of the bore, to keep the cement from squeezing through when the flanges are screwed together. It is indestructible by steam or water, and makes one of the best joints known to the engineer.

Another Formula.—The following mixture, it is said, makes a cement impermeable by air or water, hot or cold : Six parts of finely powdered graphite, three parts slaked lime and eight parts of sulphur, are mixed with seven parts of boiled oil. The mass must be well kneaded until the mixture is perfect.

Iron to Wood Cement.—Iron may be cemented into wood by dropping in the recess prepared in the latter, a small quantity of strong solution of sal ammoniac. This causes the iron to rust, rendering it very difficult to extract.

Stove-pipe Cement.—Little breaks, cracks or crevices may be stopped by making a cement of wood ashes and common salt, as for stoves, and yet it is the best way to cast aside all defective lengths and purchase new. All of the joints above the second floor should be riveted together. They may be taken down and carried out in a body, and cleaned by attaching a swab to the end of a pole.

Movable Joint Cement.—Where a joint in iron is to be occasionally opened, a cement may be made of white and red lead, equal parts, ground in linseed oil and spread on canvas or woolen, and put between the parts.

Iron Retorts Cement.—Take fifteen parts fire clay, one part saleratus, and mix into a thick paste with water. It should be applied when the retort has been heated for working. After applying the cement, coat it over with fine coal dust. Work may be resumed at once.

Cast Iron Cement.—For general purposes upon cast iron, the following is said to be a good formula for cement. The substances, however, have been given in previous items.

Take of sal ammoniac, two ozs. ; flowers of sulphur, one oz. ; clean cast iron borings or filings, sixteen ozs. ; mix them well in a mortar, and keep them dry.

When required for use, take one part of this powder and twenty parts of clean iron borings or filings, mix thoroughly in a mortar, make the mixture into a stiff paste with a little water, and apply it between the joints, and screw them together. A little fine grindstone sand added improves the cement.

TO STAIN WOOD, IRON, HORN, ETC.

To Stain Boxwood Brown.—Heat the wood by the fire until it has a gentle warmth ; then apply aquafortis with a feather evenly over the surface, until the desired shade is obtained ; then oil and polish.

To Stain Black Walnut Color.—The *Northeastern Lumberman* recommends the following manner of staining pine to represent black walnut : Put pulverized asphaltum into a bowl with about twice its bulk of turpentine and set where it is warm, shaking from time to time until dissolved ; then strain and apply with either a cloth or a stiff brush.

Try a little first, and if the stain be too dark, thin it with turpentine. If desirable to bring out the grain still more, give a coat of boiled oil and turpentine.

When the wood is thoroughly dry, polish with a mixture of two parts shellac varnish and one part boiled oil. Apply by putting a few drops at a time on a cloth and rubbing briskly over the wood.

Second Method.—The appearance of walnut may be given to white woods, by painting or sponging them with a concentrated warm solution of permanganate of potassa. The effect is different on different kinds of timber; some becoming stained very rapidly, others requiring more time for this result. The permanganate is decomposed by the woody fiber; brown peroxide of manganese is precipitated, which is afterward removed by washing with water. The wood, when dry, may be varnished, and will be found to resemble very closely the natural dark woods.

Third Method.—Use burnt umber; which can be had in the dry state at any paint shop. It may be mixed—simply stirred up thoroughly—with water or with ale. Ale does not dry so quickly, and allows of more thorough rubbing in. You will find that, while the wood is stained, the “grain” is preserved, and will be brought out by the varnish in a manner that will surprise those who have never done such work. If you wish the job to be extra nice, put on a second coat of varnish, a little at a time; rub it dry with an oiled woollen rag, and you will have a hard, smooth finish.

Darkening Butternut.—An imitation of walnut is made by washing butternut wood with lime water and then varnishing. Lime water will also stain cherry wood to a good imitation of mahogany.

To Stain Ebony Color.—An excellent black stain may be got by a mixture of pounded asphalt and mineral naphtha. The proportions must be according to the degree of blackness required, the more the asphalt the blacker the stain; but as it is very volatile, it must be mixed in a corked bottle and laid on quickly with a brush. Drop a little sulphuric acid into a small quantity of water, brush over the wood and hold to the fire; it will be a fine black and receive a good polish.

Another Method.—Take half a pound or so, according to size of the job, of logwood chips, and boil them with water until the extract is of a very dark color; put on three coats of this extract when boiling hot, allowing the work to get dry, and lightly sand papering after each coat. Then put some rusty nails into a stone ware jar and pour over them some strong vinegar; allow the nails to remain a few days; brush the solution over the wood, which will immediately become jet black. When dry it will be of a dull bluish black, but a coat of shellac will again make it like ebony. Before applying the varnish, rub down the table with No. 9 sand paper.

To Stain Wood Black.—Apple, pear, and walnut wood, if fine grained, may be stained black by the following process: Boil in a glazed or enam-

eled iron vessel with water four ounces of ground gall-nuts, one ounce of logwood chips, and half an ounce each of green vitriol and crystals of verdigris. Filter while warm, and brush the wood over with this repeatedly. Dry and brush over with strong cold solution of acetate of iron, and dry. Repeat this several times, and finally dry in an oven at a moderate temperature, and oil or varnish.

Another Method.—To turn oak black, the wood should be immersed for forty-eight hours in a hot saturated solution of alum, and then brushed over several times with a logwood decoction, prepared as follows : Boil one part of best logwood with ten parts of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one-half.

To every quart of this add from ten to fifteen drops of a saturated solution of indigo, completely neutral. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdigris in hot, concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained.

Black Stain to Polish.—Cover the wood with lampblack ground in gum arabic water, with a muller, and when it is dry, polish thoroughly, and it will look very well. Another way is to put little pieces of very rusty iron into good black ink, and let it stand two weeks ; after which, rub the wood with it, and it will penetrate ; then polish, and it will look beautiful.

To Stain Wood Red.—Take half a pound of Brazil wood, a handful of quicklime and two handfuls of ashes ; let them steep for half an hour in water, and settle to the bottom ; then take a new earthen pot and put in the Brazil wood, with the lye made of lime and ashes, and having steeped it half an hour, boil it.

Let it cool a little, and pour it into another new pot, adding to it half an ounce of gum arabic ; then put some rain water with a piece of alum into another pot or pan ; boil it, soak the wood in this alum water, then take it out and dry it, then warm your red color, and with a brush rub it as long as you think necessary ; then dry it and polish with a piece of ivory, and it will be of a shining scarlet color.

Stain for a Violin.—Dragon's blood, two ounces ; spirits of wine, one quart. Digest with occasional agitation until dissolved.

To Stain Rosewood and Cherry Color.—To imitate rosewood, a concentrated solution of hypermanganate of potassa is spread on the surface of the wood, and allowed to act until the desired shade is obtained. Five minutes suffice ordinarily to give a deep color. A few trials will indicate the proper proportions. On cherry, it gives a very beautiful red color. The color resists well the action of air and light, and the process is very short.

A Purple Color for Wood.—Steep turnsole as is directed for violet color, and add to it the tincture of Brazil boiled in lime water. It makes an excellent purple. This ought to be varnished, both to beautify and preserve it.

To Stain Wood Blue.—Boil a quarter of a pound of turnsole for an hour in three pints of lime water, and color the wood with it.

To Stain Wood Yellow.—According to Niedling, a beautiful orange-yellow tone may be imparted to oak wood by rubbing it in a warm room, with a mixture of about three ounces of tallow, three-fourths of an ounce of wax and one pint of oil of turpentine, mixed by heating together and stirring. It may be done also either with French berries, or with turmeric or saffron, or with merita earth, or a very small bit of aloes put into the varnish will make the wood of a good yellow color.

To Stain Wood Violet Color.—Boil four ounces of Brazil and eight ounces of logwood together, in two quarts of water, with an ounce of common alum. Steep the wood in this.

Another Method.—Temper Dutch turnsole with water, and strain it through a cloth. Before it is used on your work, try it on a piece of wood, to see if it is not too deep. When you have laid on the color, put some of the same color to a quantity of water, to render it very thin, and wash the wood with this till it becomes bright; then dry it, burnish and varnish it.

To Stain Mahogany Color.—Take half a pint of nitric acid, a piece of alum about the size of a walnut, and as much logwood as will give the desired color.

Another Method.—Boil Brazil wood in a weak solution of alum; strain and add a little potash. A good varnish for wood stained with this mixture may be made by dissolving amber in oil of turpentine, mixed with a small portion of linseed oil.

Mahogany Color with Pigments.—To make a very pretty, and yet cheap, mahogany colored paint, add a little lampblack to Venetian red and oil. I have used this for years. Varnished, it looks very well where the right shade is obtained.

Another Method.—Burnt sienna, or Vandyke brown, finely ground in linseed oil and rubbed in with a flannel, will stain wood. The sienna gives a richer, red brown, the Vandyke brown a darker brown. The latter method may be used to stain any kind of wood, and is in many cases preferable to stains put on by watery decoctions of dye woods.

To Stain Iron or Steel Brown.—Dissolve in four parts of water two parts of crystallized chloride of iron, two parts of chloride of antimony and one part of gallic acid, and apply the solution with a sponge or cloth to the article and dry it in the air. Repeat this any number of times, according to the depth of color which it is desired to produce. Wash with water and dry, and finally rub the articles over with boiled linseed oil. This metal thus receives a brown tint and resists moisture. The chloride of antimony should be as little acid as possible.

To Stain Oaken Color.—An oaken color can be given to new wood

by washing it in a solution of copperas dissolved in lye, a pound of the former to a gallon of the latter. When dry, this should be oiled, and it will look well for a year or two ; then renew the oiling.

Another Method.—Equal parts of potash and pearlash, two ounces each to about one quart of water, give a good oak stain. Use carefully, as it will blister the hands. Add water if the color is too deep.

To Imitate Old Oak.—The appearance of old oak may be obtained by exposing any article of new oak in the vapors of ammonia. Every variety of tint may be procured, according to the duration and temperature of the volatile compounds. A new oak carved chair, exposed to the vapors of ammonia, will, in about twelve hours, have all the appearance of having been made two hundred years before.

Another Method.—To make oak paneling look like old oak, put some common soda into some hot water—let the solution be very strong—and sponge over two or three times with it. When it is quite dry, rub with fine emery paper, as the soda raises the grain of the wood, and finish off with the best linseed oil.

To Stain Floors Oak.—To strong lye of wood ashes, add enough copperas for the required oak shade. Put this on with a mop, and varnish afterward.

Coloration for Veneering.—For making a good coloration of wood for veneering, it is necessary to make the color penetrate thoroughly, and to accomplish this the wood may be soaked for twenty-four hours in a solution of caustic soda, and finally boiled for half an hour ; on being washed and dipped in the color bath for twenty-four hours, it takes the color all through.

To Stain Horn Tortoise Color.—A mixture of equal quantities of glue, lime and red lead, with strong soap lyes, is used to stain horn in imitation of tortoise shell. The mixture may be laid on with a small brush. It requires a little skill to lay it on in such a way as to make the mottling appear natural. The operation should be repeated two or three times, each time allowing the mixture to dry before another application.

To Stain Oak Mahogany Color.—Pour two quarts of boiling water over one ounce of commercial extract of logwood, and when it is dissolved add one dram of yellow chromate of potash, and stir well. This stain is cheap, keeps well, and can be applied cold with a brush without any preparation.

To Stain Musical Instruments Crimson.—Boil one pound of ground Brazil wood in three quarts of water for an hour ; strain it and add one half an ounce of cochineal ; boil it again for half an hour gently, and it will be fit for use.

To Stain Musical Instruments Purple.—Boil one pound of chip logwood in three quarts of water for an hour ; then add four ounces of pearlash and two ounces of indigo pounded.

Stain for a Floor.—Sometimes one is desirous of staining a floor so that it shall have the appearance of being laid every other board of dark wood. This may be done by first scouring the floor perfectly clean and removing grease spots. Then apply to every other board a stain made of a quarter of a pound of asphaltum and half a pound of beeswax to one gallon of turpentine.

If found too thin, add beeswax; if too light in color, add asphaltum, though that must be done with caution, as very little will graduate the shade, and black walnut is not what its name indicates, but a rich, dark brown. Burnt umber in alcohol, to the proper consistency for easy application, may be used without the beeswax, and after a thin coat of shellac has been laid over the whole, and the surface smoothed over with sand paper, a coat of common varnish will give it a splendid finish.

When staining a board, to prevent daubing, and to make the job look nice, take a thin piece of board a few inches wide, and plane one edge thin. This can be shoved along between the boards in the crack as the stain is applied.

To Stain Ivory and Bone.—These may be stained with the ordinary dyeing materials. The body should first be steeped in the mordant, and then in a hot bath of coloring material. Bichloride of tin as a mordant will give red with Brazil wood or cochineal, yellow with fustic, violet with logwood.

To Stain Horn Black.—Steep brass in aquafortis till it is turned green; with this the horn is to be washed once or twice, and then put into a warmed decoction of logwood and water.

Another Method.—Horns receive a deep black stain from solution of nitrate of silver. It ought to be diluted to such a degree as not sensibly to corrode the substance, and applied two or three times if necessary, at considerable intervals, the matter being exposed as much as possible to the sun, to hasten the appearance and deepening of the color.

To Stain Horn Green.—First boil it in alum water, then with verdigris, ammoniac, and white wine vinegar, keeping it hot therein till sufficiently green.

To Stain Horn Red.—Boil it in alum water, then with verdigris, ammoniac, and finished by decoction in a liquor compounded of quicklime steeped in rain water, strained, and to every pint, add an ounce of Brazil wood. In this decoction the horns are to be boiled till sufficiently red.

To Stain Paper Green.—Paper or parchment may be stained green by a solution of verdigris in vinegar, or by the crystals of verdigris dissolved in water.

To Stain Paper Purple.—Paper or parchment may be stained purple by archil, or by the tincture of logwood. The juice of ripe privet berries expressed will likewise give a purple dye.

To Stain Paper Crimson.—A very fine crimson stain may be given to paper by a tincture of the Indian lake, which may be made by infusing the lake

some days in spirit of wine, and then pouring off the tincture from the dregs. It may be stained red by red ink.

To Stain Paper Orange.—Stain the paper or parchment first of a full yellow by means of the tincture of turmeric, then brush it over with a solution of fixed alkaline salt, made by dissolving one half ounce of pearlash, or salt of tartar, in a quart of water, and filtering the solution.

To Stain Paper Yellow.—Paper may be stained a beautiful yellow by the tincture of turmeric formed by infusing an ounce or more of the root, powdered, in a pint of spirit of wine. This may be made to give any tint of yellow, from the lightest straw to the full color, called French yellow, and will be equal in brightness even to the best dyed silks.

If yellow be wanted of a warmer or redder cast, annatto or dragon's blood must be added. The best manner of using these, and the preceding tinctures, is to spread them even on the paper or parchment, by means of a broad brush, in the manner of varnish.

RUST ON METALS.

To Clean Rusty Knives.—Where the knives have rusted by neglect, rub the blades over thoroughly with sweet oil; allow this to remain as long as possible, a day or so at least, then rub the steel with leather coated with finely powdered unslaked lime or pumice stone. To keep them from rusting when not in daily use, dry them thoroughly, and roll up in a flannel cloth and keep it in a dry place.

To Remove Iron Rust.—By allowing articles coated with red iron rust to remain a short time in kerosene oil, the rust can be readily removed by afterward rubbing for a few minutes with cork.

To Clean a Rusty Plow.—Pour a quart of water slowly into a half pint of sulphuric acid. The mixture will become warm from chemical action; put it on the iron and let it remain there until it evaporates. Then wash it again. The object of this is to give the acid time to dissolve the rust. Now wash with water, and you will see where the worst spots are. Apply some more acid, and rub on these spots with a brick. The acid and the scouring will remove most of the rust. Then wash the mold-iron thoroughly with water to remove the acid, and rub it dry. Brush it over with petroleum or other oil.

To Clean Rusty Flat Irons.—Have a piece of yellow beeswax tied in a coarse cloth. When the iron is almost hot enough to use, but not quite, rub it quickly with the beeswax, and then with a clean coarse cloth. This will remove it entirely, unless the rust has been upon the iron long enough to corrode

and eat into the polished surface. Fine glass paper, made after the manner of sand paper, is good for removing rust from iron or steel.

To Prevent Steel Rusting.—A simple way of preventing the oxidation of polished steel goods is to dust them over with quicklime. When articles are required to be preserved for many months (such as polished steel grates) strips of paper freely covered with powdered lime are to be wrapped around the bars; or they may be placed in cases and interstices filled up with quicklime. Piano-forte wires and small goods may be preserved in the same way.

Another Way.—Mix with fat oil varnish four-fifths of well rectified spirits of turpentine. Apply this varnish with a sponge, and the articles will retain their metallic brilliancy, and not be liable to rust; or rub over the surface a mixture formed by melting together equal parts, by weight, of paraffine and beeswax.

How to Renew Rusty Steelyards.—If the figures or marks on scale or steelyards get obscured by rust, rub them over with fine Bristol brick dust and flannel. The figures will come out bright as new.

To Prevent Iron Rusting.—Melt fresh mutton suet; smear over the irons with it while hot; then dust it well with unslaked lime, powdered and tied up in muslin. When not used, wrap the irons in baize, and keep them in a dry place. Use no oil on them at any time, except salad oil.

Another Method.—Moderately heated benzine dissolves half its weight of wax; and if this solution be carefully applied to the tool with a brush, the evaporation leaves a very adhesive and permanent coating of wax, which will preserve the metal even from the action of acid vapors.

Kerosene for Preventing Rust.—Kerosene applied by means of a moistened cloth to stoves, it is said, will effectually keep them from rusting. It is also an excellent material to apply to all iron utensils used about the premises.

Protecting Polished Surfaces.—Beeswax dissolved in benzine makes an excellent varnish for the protection of highly polished metallic surfaces. It may be applied with a brush.

Another Method.—Rust may be kept from polished iron work by coating the metal with a mixture consisting of copal varnish mixed with as much olive oil as will give it a degree of greasiness, adding thereto nearly as much spirits of turpentine as of varnish; or varnish with wax dissolved in benzine, as given above.

To Clean Rusted Grates.—Where rust has appeared upon grates or other iron fixtures exposed to heat, apply a mixture of tripoli, with half its quantity of sulphur, well ground together and laid on with a piece of soft leather; or emery and oil may be applied with excellent effect. The last named will not only clean, but polish, so that whiting will not be required.

TREATMENT OF BRASS ARTICLES.

How to Melt Brass.—To melt brass in an ordinary fire, put it into a sand crucible with a little borax, placing the crucible well down in the fire.

How to Soften Brass.—To make brass soft, heat it to a low red and plunge in water. It cannot be hardened except by rolling or hammering.

To Color Brass Black.—Make a strong solution of nitrate of silver in one dish and nitrate of copper in another. Mix the two together and plunge the brass into it. Now heat the brass evenly until the required degree of dead blackness is obtained. This is the method used by French instrument makers to produce the beautiful dead black color so much admired in optical instruments.

To Make Brass Brilliant.—Beat sal ammoniac into a fine powder, then moisten it with soft water, rubbing it on the ornaments, which must be heated over charcoal and rubbed dry with bran and whiting.

Another Method.—Wash the brass work with roche alum boiled in strong lye, in the proportion of an ounce to a pint. When dry it must be rubbed with fine tripoli. Either of these processes will give to brass the brilliancy of gold.

To Bronze Brass Objects.—First clean and warm the articles, then wash over with a hot solution of ammonium chloride (sal ammoniac), then place overnight in a diluted solution of two parts verdigris and one part ammonium chloride in six parts of vinegar. In the morning remove and wash.

To Silver Brass Objects.—Mix three parts of chloride of silver with twenty parts of powdered cream of tartar and fifteen parts of powdered common salt. Moisten a suitable quantity of the mixture with water, and rub it with a piece of blotting paper upon the metallic object, which must be thoroughly clean. The latter is afterward rubbed with a piece of cotton upon which precipitated chalk is dusted, then washed with water, and polished with a dry cloth.

Another Method.—Take one ounce of aquafortis and dissolve in it, over a moderate fire, one dram of good silver cut small or granulated; this silver being wholly dissolved, take the vessel off the fire and throw into it as much white tartar as is required to absorb all the liquor. The residue is a paste, with which you may rub over any work made of copper, and which will give it the color of silver.

To Clean Brass.—Rub the surface of the metal with rotten stone and sweet oil, then rub off with a piece of cotton flannel and polish with soft leather. A solution of oxalic acid rubbed over tarnished brass with a cotton rag soon removes the tarnish, rendering the metal bright. The acid must be washed off with water and the brass rubbed with whitening in powder and soft leather.

When acids are employed for removing the oxide from brass, the metal must be thoroughly washed afterward, or it will tarnish in a few minutes after being exposed to the air. A mixture of muriatic acid and alum dissolved in water imparts a golden hue to brass articles that are steeped in it for a few seconds.

Polish on Brass.—Owing to irregularities of surface, it often happens that difficulty is encountered in putting a good polish on articles of brass or copper. If, however, they be immersed in a bath composed of aquafortis one part, spirits of salt six parts, and water two parts, for a few minutes if small, or twenty or thirty if very large, they will become covered with a kind of black mud, which, on removal by rinsing, will display a beautiful lustrous under surface. Should the luster be deemed insufficient, the immersion may be repeated, care being always taken to rinse thoroughly. All articles cleaned in this manner should be dried in hot, dry sawdust.

MANAGEMENT OF STEEL ARTICLES.

To Clean Steel Ornaments.—Dip a small brush into some paraffine oil and then into some emery powder—such as is used in the knife machines—and we'll brush the ornaments, and all the rust will soon come off; polish with a dry leather and duster.

To Restore "Burnt" Steel.—Small articles, such as punches, are very likely to lose their temper by exposure to heat. When this occurs, they may be restored by the following mixture: Two ounces of bichromate of potassa, one ounce of pure niter, one ounce of gum aloes, one ounce of gum arabic, and two ounces of resin. The whole having been well powdered and mixed, the piece of steel is heated to a low red heat, and the powder put on. It is then heated again to a low red heat, and cooled. The steel will then be very hard again. The amount of niter may be doubled and that of the resin taken ten times larger; this is said to produce a greater hardness.

How to Gild Steel.—Dissolve pure gold in aqua regia, evaporate gently to dryness, so as to drive off the superfluous acid, redissolve in water, and add three times its bulk of sulphuric ether. Allow it to stand for twenty-four hours in a stoppered bottle, and the ethereal solution of gold will float at the top. Polished steel dipped in this is at once beautifully gilded, and by tracing patterns on the surface of the metal with any kind of varnish, beautiful devices in plain metal and gilt will be produced.

To Weld Steel to Iron.—To make a good weld, the steel should be heated to a less degree than the iron, as it is more fusible. Sal ammoniac cleans dirt from steel, and borax causes it to fuse before it obtains that heat which will cause it to burn: consequently a mixture of these two substances form one of the best materials for welding.

To Protect Polished Steel.—A scientific journal claims that after dipping polished steel in a solution of common soda, one of soda to four of water, atmospheric influences will not change it. To renew it when corroded, brush with a paste composed of one-half ounce cyanide of potassium, half ounce Castile soap, one ounce whiting and water sufficient to form a paste. The steel should first be washed with a solution of half an ounce cyanide of potassium in two ounces of water.

INKS AND INK MAKING.

To Keep Ink from Molding.—Two or three drops of carbolic acid put into an ordinary bottle of ink will prevent the fluid molding.

To Take Ink from Floors.—Ink spots on floors can be extracted by scouring with sand wet in oil of vitriol and water. When the ink is removed rinse with strong pearlash water.

To Remove Marking Ink.—Ordinary marking ink is removed by wetting with a solution of cyanide of potassium and afterward washing with water. The cyanide must be carefully handled, as it is a violent poison.

To Remove Ink from Fabrics.—As soon as the accident happens, wet the place with juice of sorrel or lemon, or with vinegar, and the best hard white soap, or use a weak solution of oxalic acid.

To Take Ink from Books.—First wash the paper with warm water, using a camel's hair pencil for the purpose. By this means the surface ink is got rid of; the paper must now be wet with a solution of oxalate of potash, or better still, oxalic acid, in the proportion of one ounce to half a pint of water. The ink stains will immediately disappear. Finally, again wash the stained place with clean water, and dry it with white blotting paper.

To Take Ink Out of a Carpet.—While the ink is fresh take a basin of sweet skimmed milk and a sponge; pour the milk freely over the spots and then absorb it again with the sponge. Repeat this operation three or four times until the milk no longer blackens, and then wash the milk from the spot with a cloth and water, and not a stain will remain. If the stain is old, oxalic acid diluted and blotting paper may be used.

To Write on Greasy Paper.—Put to a bullock's gall one handful of salt, and one-fourth pint of vinegar, stir it until it is mixed well; when the paper or parchment is greasy, put one drop of the gall into the ink, and the difficulty will be instantly obviated.

To Remove Indelible Ink.—When the ink is made of a silver compound, a solution of cyanide of potassium will answer; or a solution of corrosive sublimate and sal ammoniac, equal parts, in fifty to one hundred parts of

water. It will take out all silver spots on cotton, linen, wool, and also from the hands.

Ink for Marking Tin.—An ink composed of copper one part, dissolved in ten parts nitric acid, ten parts water being afterward added, is useful for marking on tin or zinc plant labels.

To Make Red Writing Ink.—Take best carmine two grains, rain water one half ounce, water of ammonia twenty drops, and a little gum arabic.

Another Formula.—Dissolve twenty-five parts, by weight, of saffranin, in five hundred parts of warm glycerine, then stir in carefully five hundred parts of alcohol and an equal quantity of acetic acid. It is then diluted with nine thousand parts water, in which is dissolved a little gum arabic.

To Make Black Writing Ink.—To five gallons of water at boiling heat, add one half pound logwood, one half ounce bichromate of potash, and one half ounce prussiate of potash. Your ink is then made and ready for use. The cost is six cents per gallon. Less amount in same proportions.

Another Formula.—India ink dissolved in water, makes an excellent writing fluid, better than most of the materials for sale at the stores. It flows nicely and will keep for any length of time without deteriorating in quality. Some add one tenth volume of glycerine and shake well together.

To Make Blue Writing Ink.—Take soft Prussian blue six parts and oxalic acid one part; powder finely, add soft water enough to bring to thin paste; let it stand a few days, then reduce to desired shade by adding water in which a little gum arabic has been dissolved. The common box, or prepared bluing, put in water, makes a very good writing fluid.

To Make Green Writing Ink.—Dissolve one of the aniline greens in hot water to proper shade and add a few drops of clove oil.

Another Formula.—For green ink, pound French berries, and steep until a good strong yellow is made, then put in enough of the prepared blue to get the desired shade of green. A little alum in a saffron decoction makes a fine yellow, which may be turned green by use of prepared indigo.

The inner bark of black oak, steeped until a strong decoction of yellow is obtained, makes a beautiful green by addition of blue.

To Make Violet Ink.—Eight parts of logwood and sixty-four parts of water; boil down to one half original quantity, then strain and add one part of chloride of tin.

To Make Magic Ink.—A solution of nitrate of chloride of cobalt, or choride of copper, mixed with a little gum or sugar, produces a "magic ink," which is made visible by warming, either by holding against the stove or over a burning match. Potassium ferrocyanide in solution may also be used; but this requires a developer, for which either copper or iron sulphate may be employed. With the former the writing will appear in brown, and with the latter in blue color.

Black Indelible Ink.—Twelve and a half grains of nitrate of silver, a piece of gum arabic the size of a bean: put that into a vial with two teaspoonfuls of water; let it remain three or four days in the sun, or at the fire, and it will dissolve and turn black. The preparatory liquid is one ounce of pearlash, to be put into a bottle with one and a half ounces of water, and a piece of gum arabic the size of a nutmeg.

Another Formula.—This ink is made of two parts of powdered acetate of copper, four parts of sal-ammonia, one part of lampblack, and twenty parts of water, well mixed together. They make a good indelible ink, which, however, must always be well shaken before using.

Purple Italian Indelible Ink.—The Italian ink of the trade is a chloride of gold. The material to be marked is first moistened with a solution of chloride of tin, and dried. Then, upon writing with the gold chloride, a precipitate of gold purple, the beautiful purple of Cassius, is the result, which penetrates the fibers very minutely.

Purple-red Indelible Ink.—The place where the linen is to be marked is first wet with a solution consisting of three drs. of carbonate of soda, and three drs. of gum arabic, dissolved in one and one-half oz. of water, then dried and smoothed. The place is now to be written on with a solution composed of one dr. of chloride of platina dissolved in two oz. of distilled water, then allowed to dry. When quite dry, the writing is to be painted over with a goose's feather, moistened with a liquid consisting of one dr. of protochloride of tin dissolved in two oz. of distilled water.

Blue Indelible Ink.—Take five parts of oxide of molybdenum, dissolved in the requisite quantity of hydrochloric acid; two parts of the extract licorice, and six of gum arabic dissolved in two hundred parts of water. These two solutions are mixed, and after writing with them on the objects, the spot written upon is moistened with a solution of chloride of tin in water. This indelible ink not only withstands washing, but also all kinds of acids and alkalis, except those which also destroy the linen.

Another Formula.—Take of iodide of potassium, one oz.; iodine, six drs.; water, four oz.; dissolve. Make a solution of two oz. of ferrocyanide of potassium in water. Add the iodine solution to the second. A blue precipitate will fall, which, after filtering, may be dissolved in water, forming a blue ink.

This blue, added to common ink, renders it indelible.

To Take Ink from Press Rollers.—Use benzine and a soft sponge. Follow with a clean sponge and water. Strong alkaline washes injure the face of a roller.

To Remove Printers' Ink from the Hands.—First rub the hands with some kind of grease or animal oil, then use soap and warm, soft water. If the ink is well ground into the pores, a little diluted lye and fine sand may be used.

To Remove Printers' Ink from Wood.—Sometimes it is necessary to remove printers' ink from wood where lye or other fluids cannot be used, and in such cases the ink may be completely removed by use of the erasing rubber, even if the surface is uneven, as in case of a piece of engraved wood.

To Remove Ink from Type.—Strong lye from wood ashes applied with a brush is good. If concentrated lye is used, make the solution by putting one pound of the lye into five gallons of water.

HOW TO MAKE PASTES.

A Perpetual Paste.—Is a paste that may be made by dissolving an ounce of alum in a quart of warm water. When cold, add as much flour as will make it the consistency of cream; then stir into it half a teaspoonful of powdered resin, and two or three cloves. Boil it to a consistency of mush, stirring all the time. It will keep for twelve months, and when dry may be softened with warm water.

Paste for Scrap Books.—Take half a teaspoonful of starch, same of flour, pour on a little boiling water, let it stand a minute, add more water, stir and cook it until it is thick enough to starch a shirt bosom. It spreads smooth, sticks well and will not mold or discolor paper. Starch alone will make a very good paste.

A Strong Paste.—A paste that will neither decay nor become moldy; mix good clean flour with cold water into a thick paste well blended together, then add boiling water, stirring well up until it is of a consistency that can be easily and smoothly spread with a brush; add to this a spoonful or two of brown sugar, a little corrosive sublimate and about half a dozen drops of oil of lavender, and you will have a paste that will hold with wonderful tenacity.

A Brilliant Paste.—A brilliant and adhesive paste, adapted to fancy articles, may be made by dissolving caseine precipitated from milk by acetic acid and washed with pure water in a saturated solution of borax.

A Sugar Paste.—In order to prevent the gum from cracking, to ten parts by weight of gum arabic add three parts of sugar, add water until the desired consistency is obtained. If a very strong paste is required, add a quantity of flour equal in weight to the gum, without boiling the mixture. The paste improves in strength when it begins to ferment.

Acid-Proof Paste.—A paste formed by mixing powdered glass with a concentrated solution of silicate of soda makes an excellent acid-proof cement.

Paper and Leather Paste.—Cover four parts, by weight, of glue, with fifteen parts of cold water, and allow it to soak for several hours, then

warm moderately till the solution is perfectly clear, and dilute with sixty parts of boiling water, intimately stirred in. Next prepare a solution of thirty parts of starch in two hundred parts of cold water, so as to form a thin homogeneous liquid, free from lumps, and pour the boiling glue solution into it with thorough stirring, and at the same time keep the mass boiling.

Paste for Papering Boxes.—Boil water and stir in batter of wheat or rye flour. Let it boil one minute ; take off and strain through a colander. Add, while boiling, a little glue or powdered alum. Do plenty of stirring while the paste is cooking, and make of consistency that will spread nicely.

Paste to Fasten Cloth to Wood.—Take a plump pound of wheat flour, one tablespoonful of powdered resin, one tablespoonful of finely powdered alum and rub the mixture in a suitable vessel, with water, to a uniform, smooth paste ; transfer this to a small kettle over a fire, and stir until the paste is perfectly homogeneous without lumps. As soon as the mass has become so stiff that the stirrer remains upright in it, transfer it to another vessel and cover it up so that no skin may form on its surface.

This paste is applied in a very thin layer to the surface of the table ; the cloth, or leather, is then laid and pressed upon it, and smoothed with a roller. The ends are cut off after drying. If leather is to be fastened on, this must first be moistened with water. The paste is then applied, and the leather rubbed smooth with a cloth.

Paste for Tin.—For fastening labels to tin, it is said that the addition of a little honey to common flour paste will make a most excellent adhesive substance.

Paste for Printing Office.—Take two gallons of cold water and one quart wheat flour ; rub out all the lumps, then add one-fourth pound of finely pulverized alum and boil the mixture for ten minutes, or until a thick consistency is reached. Now add one quart of hot water and boil again, until the paste becomes a pale brown color, and thick. The paste should be well stirred during both processes of cooking. Paste thus made will keep sweet for two weeks and prove very adhesive.

HOW TO MAKE MUCILAGE.

Commercial Mucilage.—The best quality of mucilage in the market is made by dissolving clear glue in equal volumes of water and strong vinegar, and adding one-fourth of an equal volume of alcohol, and a small quantity of a solution of alum in water. Some of the cheaper preparations offered for sale are merely boiled starch or flour, mixed with nitric acid to prevent their gelatinizing.

Gum Arabic Mucilage.—Put half a pound of gum arabic in a quart bottle ; then pour in water till the bottle is nearly full, and put in a wine glass of wine, vinegar, brandy, whisky or alcohol, which will prevent putrid fermentation ; shake your bottle occasionally for two or three days ; you will then have a bottle of gum mucilage that will never spoil.

Another Formula.—Take gum arabic an ounce and a half, water three ounces, making a thick, strong mucilage (the thickness saves a great deal of time in its use), and then add fifteen drops of saturated solution of carboline in water. Weather never affects it, it does not sour.

Gum Tragacanth Mucilage.—A good mucilage can be made by mixing gum tragacanth with water in a vial, and set in a warm place twelve or fourteen hours. Its appearance will be like starch, and it can be made thick or thin to suit, by the quantity of water used.

Another Formula.—Two parts of gum tragacanth and one part of powdered gum arabic ; cover with cold water till dissolved, then reduce to desired consistency with same. A few drops of carbolic acid will prevent souring.

Mucilage for Metals.—Glue, water and three per cent. of nitric acid adheres well to metallic surfaces.

Pocket Mucilage.—Boil one pound of the best white glue, and strain very clear ; boil, also, four ounces of isinglass, and mix the two together ; place them on a water bath, with half a pound of white sugar, and let them evaporate till the liquid is thick, when it is to be poured into molds, cut, and dried. The mucilage, which may be carried in the pocket, immediately dissolves in water, and fastens paper very firmly.

To Keep Mucilage from Molding.—Solutions of gum arabic soon mold and sour, and finally lose their adhesive property. It is said that a little sulphate of quinine will prevent this, while it imparts no bad odor of its own. A few drops of carbolic acid to a bottle of mucilage will preserve it, also a little vinegar, as it contains acetic acid. Alcohol and alum are both good.

TANNING AND CARE OF LEATHER.

Tanning Small Hides.—Bark tanning is a process that belongs to the professional tanner. I shall only give simple methods for home use. Soak the skin in water well impregnated with lime for a week or two, or until the hair can be removed ; then soak and wash until all the lime is taken out. Now make a solution of two parts salt to one of alum, and soak for a few days in this liquid ; then hang up where it will drain and dry. When half dried, begin work upon it, and continue whipping and rubbing until it is entirely cured. Leather prepared in this way is very tough and flexible, but it will not answer for footwear, or any place where it is liable to become soaked with water.

Tanning with Glycerine.—Glycerine, it is claimed, will preserve and increase the elasticity and resistance of leather. This system of tanning is particularly adapted to straps and belts of machinery, as it keeps them from drying and cracking. It is only necessary to immerse the leather, tanned in the usual manner, in a bath of glycerine, and to leave it for several weeks, when the pores will be impregnated with the greasy substance, and the leather will be found to be much more elastic and tenacious.

Uses of Rawhide.—Considerable use is now made of the hides of animals untanned. Rawhide is used for hoisting purposes in warehouses, mines, etc., as also on shipboard for tiller and other ropes, and there are many other uses to which it may be put. The skin should be cut into strips, and the hair shaved close with a sharp knife. It may be made soft by rubbing on the edge of a board.

A rawhide halter strap, an inch wide, it is claimed, is stronger and will last longer than an inch rope. It is stronger than hoop iron, and more durable, and may be used to hoop dry casks and boxes. It is as good as wire upon a broken thill, or any woodwork that is splintered. Put it on wet and nail fast. It shrinks down in drying.

To Make Leather Water-proof.—Leather can be made water-proof by coating it, until it will absorb no more, with linseed oil and Venice turpentine; boil half a pound of the latter in one quart of the oil, and apply while warm. I very much doubt this mixture adding to durability of leather.

Another Method.—Dissolve three quarters of an ounce of paraffine in a pint of lard oil. The best quality of oil should be used. It will be necessary to heat the oil slightly in order to dissolve the paraffine. This preparation will harden leather somewhat, but it is valuable where boots or other leather articles are to be for some time in water. The hardness may be lessened by reducing the amount of paraffine, but it is less impervious to water.

Third Method.—Melt together beef tallow four ounces, resin one ounce, and beeswax one ounce, and when nearly cooled solid, add as much neat's-foot oil as the above mixture measures. It is to be applied with a soft rag. The leather should be warmed before a fire and the application well rubbed in. It requires two applications to make the leather thoroughly water-proof.

To Clean Leather.—Castile soap in warm water, or a little sal soda in water, will remove grease. For carriage leather, milk and water is good. To remove ink stains from leather, use oxalic acid diluted. This acid is poison and should be used with care. In dilution, it may be used one ounce of crystals to a pint of water.

To Harden Leather.—Leather may be stiffened by extracting the oily matters with bisulphide of carbon, and afterward immersing it for a short time in a hot concentrated solution of zinc chloride, pressing and drying at about 220° Fahr,

To Restore Patent Leather.—Take one pint of raw linseed oil, four ounces of cider vinegar, two ounces of spirits of wine, one ounce of butter of antimony, half an ounce of spirits of hartshorn, half an ounce of camphor, and half an ounce of lavender. Shake them well together, and they are ready for use. Apply this with a soft brush, and rub it with cotton batting until it is dry.

To Fasten Leather to Metal.—It is said that leather may be affixed to metal so that it will split before it can be torn off, by means of the following composition: A quantity of nut galls reduced to powder is dissolved in eight parts of distilled water, and, after remaining for six hours, is filtered through a cloth. At the same time take a small quantity of water and add it to one part (by weight) of glue, which is to be held in solution for twenty-four hours. The first is to be applied to the leather, the latter to the metal, which should first be roughened and heated. The leather is then laid upon the metal and dried under pressure.

Leather Pump Packing.—Leather pump packing requiring to be very tight, for small work, should not be more than one-thirty-second inch thick, and not to be bent up round the bore or sides of the barrel more than one-sixteenth inch.

To Blacken Leather.—Take two pounds of bark of elder, and the same quantity of the filings of rusty iron; steep them in two gallons of river water, and put them in a cask or vessel closely stopped. After it has thus stood two months, add to the liquid, when well pressed out, one pound of powdered nut-galls, and a quarter of a pound of copperas; and then, after stirring it over a good fire, press out the liquid, with which the leather is to be three or four times brushed over, when it becomes of an excellent and durable black.

Water-proof Leather Blacking.—Take a quarter pound of tallow, one quarter pound of beeswax, one quarter pound of resin, one pint of tanner's oil, and lampblack to color.

Bright Leather Blacking.—Take four ounces of ivory-black, three ounces of the coarsest sugar, a tablespoonful of sweet oil, and a pint of small beer; mix them gradually, cold.

To Polish Enameled Leather.—Two pints of the best cream, one pint of linseed oil; make them each lukewarm, and then mix them well together. Having previously cleaned the leather from dirt, rub it over with a sponge dipped in the mixture; then rub it with a soft dry cloth until a brilliant polish is produced.

German Liquid Leather Polish.—Dissolve three and one-half ounces of shellac in half a pint of alcohol. Rub smooth twenty-five grains of lampblack with six drams of cod liver oil, and mix. A few drops are to be applied to the leather with a sponge,

To Restore Morocco Leather.—The luster of morocco leather is restored by varnishing with white of egg.

Patent Leather Polish.—A polish for patent leather, which the *Chemist and Druggist* pronounces to be a good thing, is made by the mixing of the whites of two eggs, one tablespoonful of alcohol, two large lumps of sugar, as much finely powdered ivory black as may be required to make it black enough and of the right consistency. Lay it on lightly with a soft sponge, and rub gently with a soft cloth.

Vienna Leather Polish.—A fine polish is composed of purified lamp-black and turpentine, in which a small quantity of asphaltum has been dissolved. These articles must be well mixed, and then added to thin shellac varnish, the whole being thoroughly stirred; care must be taken not to use too much turpentine, as it will injure the luster of the polish.

Ivory Black Leather Polish.—Mix ivory black with copal varnish. The best method of mixing is to rub the black with a small quantity of the varnish until it is all moistened, and then add sufficient quantity of the varnish to reduce it to the proper degree of consistency. This black, being elastic, can be used upon collars as well as other parts of the harness, and as a renovator for carriage tops, etc.

Gloss for Leather.—Professor Bottger states that a fine golden gloss may be imparted to leather by brushing it over with a broad soft brush dipped in a concentrated solution of resin in an alcoholic solution of shellac.

Polish for Old Leather.—Take two parts of good glue and soak in tepid water until it is thoroughly softened, then add three parts of castile soap dissolved in warm water, then add five gills of water and two gills of brandy or common spirits, rubbing it until it becomes smooth; stir this into the mass, and afterward stir in two parts of wheat flour mixed smooth in cold water. The mixture is then put over a moderate fire and allowed to steam off a little, but not to boil, stirring it well while over the fire.

It can be used immediately, or made up into small cakes which can be dissolved at any time in a little water or beer. It can be put on with a brush, a thin coat only being required, and afterward rubbing it with a linen or silk cloth. It will restore old dash boards of leather, or leather tops, where the enamel is not off.

CARE OF BOOTS AND SHOES.

Hardening Shoe Leather.—One of the most important things to be observed in the management of boots and shoes is to keep the leather soft and pliable. Leather that has become hard and stiff is liable to crack and chafe, and soon become worthless.

Castor Oil for Leather.—I have found nothing so good for shoe leather as castor oil. It softens, renders the substance impervious to water, and does not interfere with putting on a polish with common blacking afterward. The boot or shoe should be thoroughly cleaned with a knife and wet cloth, but not soaked in water, and then the oil applied before the leather is quite dry. Spread three coats of oil over the surface, one after the other, as fast as they penetrate. Leather will never get hard if always oiled when damp.

Water-proof Soles.—A correspondent writing upon this subject, says that for farmers' boots when exposed to snow and slush, hot tar, if applied to the soles, will make them water-proof. Let it be as hot as the leather will bear without injury, applied with a swab, and dry by the fire. The operation may be repeated two or three times during the winter, if necessary. It makes the surface of the leather quite hard, so that it wears longer, as well as keeps the water out. One should make the test on a pair of boots not very valuable, first.

To Soften Kid Boots.—Melt a quarter of a pound of tallow and add to it the same weight of olive oil, stir, and let it stand still; apply a small quantity occasionally with a piece of flannel. Should the boots be very dirty, cleanse with warm water.

Squeaking Boots.—The squeaking of boots and shoes sometimes becomes very annoying, and especially when about the sick room or walking down a church aisle. To prevent this, drive a row of pegs through the center of the sole from the toe toward the heel. The noise is caused by the friction of the layer in the center. This method stiffens the sole somewhat, but is preferable to the annoyance. Saturating the sole with kerosene oil is said to be effectual also.

Treading Shoes to One Side.—The habit of running down the heels of boots and shoes is the result of allowing infants to stand upon their feet or to walk while too young and tender. One remedy is the practice of turning the foot in an opposite direction from which is the tendency.

As an aid to this, the heel may be built a little higher on one side than the other, and a stiff counter used. Nails driven into the heel of the shoe on the side which is worn over will be of advantage also; or better than this, a rim of steel passing around the bottom of the heel and kept in place by nails or a few short screws.

To Mend Rubber Shoes.—Get a piece of pure rubber—an old shoe—vulcanized will not do; cut it into small bits; put it into a bottle and cover to twice its depth with spirits of turpentine or refined coal tar naphtha—not petroleum naphtha. Stop the bottle and set to one side, shaking it frequently. The rubber will soon dissolve. Then take the shoe and press the rip or cut close together and put on the solution with a camel's hair brush. Continue to apply as fast as it dries until a thorough coating is formed.

Another Way.—Procure a small tin box of prepared rubber in a semi-liquid condition, which can be purchased for a few cents at almost any store where India rubber goods are kept for sale. The boot must be washed clean and dried. Then the surface around the rent is to be roughened a little with the point of a knife, after which the semi-liquid rubber is spread on with a spoon as thickly as it can be without flowing away. Then a neat patch is prepared and covered with one or two coats of the rubber. When the prepared rubber is almost dry, the patch is applied and held on firmly for a few minutes.

Heating Shoes.—The extreme heat in which most men and women expose boots and shoes during winter deprives leather of its vitality, rendering it liable to break and crack. When leather becomes so warm as to give off the smell of leather, it is singed. Close rubber shoes also destroy the life of leather. All varnishes and all blacking containing the properties of common varnish should be avoided.

Varnish for Ladies' Shoes.—Place three pounds of rain water in a pot over the fire, and, when boiling, add four ounces of white pulverized wax, one ounce of clear, transparent glue in small pieces, two ounces of pulverized gum Senegal, two ounces of white soap scraped fine, two ounces of brown pulverized sugar. The ingredients are placed in one by one, and every time stirred up; it is well to take the pot from the fire every time a substance is added, to prevent boiling over.

When all is added, the pot is removed from the fire, and when sufficiently cooled, three ounces of alcohol are added, and finally three ounces of fine Frankfort black, well incorporated by continued stirring. This varnish is put on the leather with a brush, and is very valuable for boots and shoes, as it can be afterward polished with a large brush like ordinary blacking, shows a high polish, and does not soil the clothing.

Shoe Blacking without Acid.—This recipe is said to produce a superior article of shoe blacking. From three to four pounds of lampblack and one half pound of bone black are well mixed with five pounds of glycerine and treacle. Meanwhile two and one half ounces of gutta percha are cautiously fused in a copper or iron saucepan, and ten ounces of olive oil added, with continual stirring, and afterward one ounce of stearine.

The warm mass is added to the former mixture, and then a solution of five ounces of gum Senegal in one and one half pounds of water and one dram each of the oil of rosemary and lavender may be added. For use, the blacking is diluted with three to four parts of water. This blacking keeps the leather soft, and renders it more durable.

Blacking Ball for Shoes.—Take mutton suet four ounces, beeswax one ounce, sweet oil one ounce, sugar candy and gum arabic one dram each, in fine powder; melt these well together over a gentle fire, and add thereto about a spoonful of turpentine, and lampblack sufficient to give it a good black

color. While hot enough to run, make it into a ball by pouring the liquor into a tin mold, or let it stand till almost cold; or it may be molded by the hand into any desired shape.

Liquid Shoe Blacking.—As a general rule, blacking that contains acid should not be used upon leather, but the following is claimed to be an exception on account of its use in connection with sugar and oil. Take three ounces of ivory-black, two ounces of coarse sugar, one ounce of sulphuric acid, one ounce of muriatic acid, one tablespoonful of sweet oil and lemon acid, and one pint of vinegar. First mix the ivory-black and sweet oil together, then the lemon and sugar, with a little vinegar to qualify the blacking; then add the sulphuric and muriatic acids, and mix them all well together.

Cheap Ivory-Black for Shoes.—Ivory-black, two ounces, brown sugar, one and one-half ounces, and sweet oil, one-half tablespoonful. Mix them well, and then gradually add one-half pint of small beer.

Another Formula.—A quarter pound of ivory-black, a quarter pound of moist sugar, a tablespoonful of flour, a piece of tallow about the size of a walnut, and a small piece of gum arabic. Make a paste of the flour, and while hot put in the tallow, then the sugar, and afterward mix the whole well together in a quart of water.

HINTS ABOUT CORKS.

To Soften Cork.—To soften sheet cork so as to make it pliable and easily shaped, steam it thoroughly, or boil it in water for an hour or so.

To Make Cork Air Tight.—Cover with a cement made of finely powdered litharge, mixed with undiluted glycerine.

To Make Prepared Corks.—If immersed in melted paraffine, porous corks will become both gas and water-tight. Allow the corks to remain for about five minutes beneath the surface of melted paraffine in a suitable vessel, the corks being held down either by a perforated lid, wire screen or similar device. Corks thus prepared can be easily cut and bored, have a perfectly smooth exterior, may be introduced and removed from the neck of a flask with ease, and make a perfect seal. The method has long been in use in English laboratories,

How to Bore a Cork.—When it is desired to make a smooth hole through a cork, first cut with a penknife as near round as possible, and then rub through a rat-tail file.

An Improved Corkscrew.—Insert from opposite directions the prongs of a couple of two-tined table forks, then slip a knife blade between the tines and turn the cork, and lift it out.

To Get a Cork From Inside a Bottle.—Where a cork has by accident or through necessity, been forced down into a bottle, it may be removed by doubling a string and dropping the bow end into the bottle, and turning the same bottom side up. When the cork gets into the loop it may be drawn out easily.

CARE OF MARBLE.

To Clean Marble.—Fine pumice stone, newly slaked lime and verdigris mixed thick with soft soap, make a very strong preparation for cleaning marble. It should be put in a woolen rag, and rub the stains well one way. Wash off with soap and water. Repeat, if not removed. Or, cover the stains with fuller's earth or plaster of Paris, and when dry brush it off.

Another Way.—Put two ounces of carbonate of soda into one quart of cold water. Brush the marble with a clean paint brush dipped in this solution, rinsing constantly with clean water. Benzine and common clay will also clean marble very well.

Still another and very good preparation is made of two parts of common soda, one part of pumice stone and one part of finely powdered chalk; sift it through a fine sieve and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble over with soap and water, and it will be as clean as it was at first.

To Polish Marble.—Rub thoroughly with a linen cloth wrapped around a block that has been wet with oxide of zinc, sometimes called "putty powder." This will also polish alabaster or common stone, providing the latter is hard enough to take a polish.

To Dress Over a Marble Mantel.—It should first be thoroughly cleaned by coating with lime and soda mixed into a paste with water. Keep this application wet for twenty-four hours, then rub off with cloths and apply the oxide of zinc paste; but keep it constantly wet. The preparation answers a very good purpose for removing scratches in show cases, or plate glass, wherever brought into contact with hard substances.

Iron Rust on Marble.—This can usually be removed by rubbing with lemon juice. Almost all other stains may be taken off by mixing one grain of finely powdered chalk, one of pumice stone, and two ounces of common soda. Sift these together through a fine sieve, and mix with water.

When thoroughly mixed, rub this mixture over the stains faithfully, and they will disappear. Wash the marble after this with soap and water, dry and polish with a chamois skin, and the marble will look like new.

To Take Stains from Marble.—A small quantity of diluted vitriol

will take stains out of marble. Wet the spots with the acid, and in a few minutes rub briskly with a soft linen cloth till they disappear.

Artificial Marble.—It is said that a nice quality of artificial marble may be made by mixing plaster of Paris in a solution of alum; bake in an oven, and grind to a powder; it may then be mixed with water and formed into any shape. It will bear a high polish.

Cement Filling for Marble.—Take of beeswax, two pounds, and of resin, one pound; melt them and add one and one-half pound of the same kind of matter, powdered, as the body to be cemented is composed of, strewing it into the melted mixture and stirring them well together, and afterwards kneading the mass in water, that the powder may be thoroughly incorporated with the wax and resin.

The proportion of the powdered matter may be varied where required, in order to bring the cement nearer the color of the body on which it is to be employed. This cement must be heated when applied, as also the parts of the subject to be cemented together, and care must be taken, likewise, that they may be thoroughly dry.

Where large cracks are to be filled before the cement is hardened, rub into the seam dust of the same material, so as to have a uniform surface. This may be used upon alabaster and different kinds of stone. See "Cements."

THE MANAGEMENT OF PAPER.

To Make Paper Water-proof.—To make water-proof packing paper, dissolve one and four-fifths pounds of white soap in one quart of water. In another one quart of water dissolve one and four-fifths ounces (Troy), of gum arabic and five and a half ounces of glue. Mix the two solutions, warm them, and soak the paper in the liquid, and pass it between rollers, or simply hang it up to dry.

Another Method.—To make common paper water-proof, prepare a solution of caoutchouc—India rubber in caoutchine, a volatile, oily liquid made from caoutchouc, sold by druggists—plunge into it once or twice unsized paper, and dry it by a gentle heat. It may then be used as a writing paper, and will resist all humidity, and small vessels made of it will even contain water.

To Water-proof Pasteboard.—The water-proofing of pasteboard may be effected with a mixture of four parts of slaked lime with three parts of skimmed milk and a little alum. As soon as mixed, the pasteboard is brushed over with two successive coatings of the preparation, and thus becomes impervious to water.

Water and Fire-proof Paper.—Dissolve eight ounces of alum and

three and three-quarter ounces of white soap in four pints of water; in another vessel dissolve two ounces of gum arabic and four ounces of glue in four pints of water. Mix the two solutions and make the mixture hot. Immerse the paper in the mixture, and then hang it up to dry or pass it between cylinders.

The alum, soap, glue, and gum form a sort of artificial covering which protects the surface of the paper from the action of water, and to a certain extent from fire. This paper will be very useful for packages which may be exposed to the inclemency of the weather.

To Make Paper Acid-proof.—Preparation for coating paper to make it resist the action of acids, alkalies, and water: Dissolve caoutchouc—solution of India rubber—cut into small shreds in a mixture of bisulphide of carbon with six per cent. of absolute alcohol. The solution may be diluted as desired with the mixed solvents.

To Make Parchment Paper.—Paper can be readily converted into vegetable parchment by immersing it for a few minutes in a mixture of two volumes of sulphuric acid and one of water. The acid should be washed off the paper by immersing and slightly agitating it in a large quantity of cold water. The last trace of acid may be removed by finally immersing the paper in water to which a small quantity of ammonia has been added.

To prevent contraction or wrinkling, the paper should be stretched on a frame while yet wet. Paper so prepared is transparent, and can be used for tracing paper; and may also be employed as a very good substitute for sheep-skin parchment.

To Renovate Old Manuscripts.—Wash the manuscript in a solution of ferro-cyanide of potassium in clean water.

How to Select Wall Paper.—If the room is small, a light colored paper with fine figure is best; if large, a larger figure may be used, but in either case reject all dull, heavy colors, and do not select high colored or gay designed, but a neat, modest figure. If the house is of old style, low between joints, paper with stripes running up and down should by all means be used; it will give the room an appearance of being large and higher walled than it really is.

Paper for Polishing.—After a stove has been blackened, it can be kept looking very well for a long time by rubbing with paper every morning. Rubbing with paper is a much nicer way of keeping a tea kettle, coffee pot and tea pot bright and clean, than the old way of washing them in suds. Rubbing with paper is also the best way of polishing knives and tinware, after scouring. This saves wetting the knife handles.

If a little flour be held on the paper in rubbing tinware and spoons, they shine like new silver. For polishing mirrors, windows, lamp chimneys, etc., paper is better than dry cloth.

Black Paper for Drawing Patterns.—Mix some smooth lamp-black and sweet oil; with a bit of flannel cover a sheet or two of large writing

paper with this mixture; then daub the paper dry with a bit of fine linen, and keep it for using in the following manner:

Put the black side on another sheet of paper, and fasten the corners together with a small pin. Lay on the back of the black paper the pattern to be drawn, and go over it with the point of a steel pencil; the black paper will then leave the impression of the pattern on the under sheet, on which you must now draw with ink.

If you draw patterns on cloth, or muslin, do it with a pen dipped in a bit of stone blue, a bit of sugar, and a little water.

To Preserve Drawings on Paper.—A simple device for the preservation of cards, drawings or photographs from injury by being handled or coming in contact with moisture, consists of a preparation of gutta-percha in solution. The liquid is thrown, in a very fine spray, over the article by an atomizer.

When the liquid has in part evaporated, which it soon does, it leaves the object coated over with a thin, translucent film, impervious to water. The gutta-percha should be dissolved in chloroform or ether. The process of dissolving the gum is in itself purifying.

A drawing or photograph protected by this film can be washed with safety. The preparation softens at a temperature of 150° Fahr.; but to this only a rare accident would subject it.

How to File Papers.—To those who have no better method I would recommend getting two pieces of card-board a trifle larger than the journal to be bound; then take a strip of canvas or thin leather as long as the cover sides, and three or more inches wide, and glue this on to the edges of the card-board so that the latter may spread apart sufficiently to admit twenty-six numbers of a weekly, or twelve of a monthly. Now about three inches from the ends of the cover, and one-fourth of an inch from the edge next the back, punch holes large enough to admit a small cord, and the binder is ready for the file.

Punch holes in the papers as fast as received to correspond with those in the cover, and with a lady's shoe string fasten in each succeeding number, by tying the strings over the back with a bow knot.

A file of this kind will stand hard usage for years, and keep the papers in nice order. It is very simple, inexpensive, and may be made quite ornamental, by covering the card-board on the outside with handsome paper and the inside with white. Black, red or blue leather makes a pretty back.

To Take Grease out of Paper.—Warm gradually the parts containing the grease, and extract as much as possible of it by applying blotting-paper. Apply to the warm paper with a soft, clean brush, some clear essential oil of turpentine that has been boiled, and then complete the operation by rubbing over a little alcohol.

To Take Grease from Parchment.—To remove grease spots from

parchment, cover with hot pipe-clay and place under pressure for a few hours.

To Take Creases out of Paper.—If it is desired to remove a crease from an engraving which has been folded, slightly moisten the back of it, over which place a cloth and apply a hot iron. Similar wrinkles and creases may be taken out of a volume of papers that would otherwise be too imperfect for binding. Carefully sprinkle the pages at regular intervals (an ordinary wisp broom is good for the purpose), and then place them in a press or under some heavy weight; when dry they will be found smooth.

To Fix Pencil Marks on Paper.—To fix pencil marks so they will not rub out, take well skimmed milk and dilute with an equal bulk of water. Wash the pencil marks (whether writing or drawing) with this liquid, using a soft flat camel hair brush, and avoiding all rubbing. Place upon a flat board to dry.

Temporary Tracing Paper.—Sometimes it is convenient to have tracing paper only temporarily transparent, and to obtain this it is only necessary to wet the sheet in benzine. After a time the benzine will evaporate and the original condition of the paper will be restored to it. In this way a design can be transferred to any part of a sheet of paper without the necessity of employing regular tracing paper for the purpose. If the drawing is not completed, the requisite portion of the paper must again be damped with the benzine.

Paper for Fruit Jars.—Preserves and pickles keep much better if brown paper instead of cloth is tied over the jar; canned fruit is not so apt to mold if a piece of writing paper cut to fit the can is laid directly on the fruit. Paper is much better to put under a carpet than straw. It is warmer, thinner, and makes less noise when one walks over it.

Paper for Beds.—Two thicknesses of paper placed between other coverings on a bed are as warm as a quilt.

Paper for Chairs.—If it is necessary to step upon a chair, always lay a paper on it, and thus save the paint or wood work from damage.

DRAWING AND MOUNTING MAPS.

Material for Map Making.—A correspondent of the *Sunday School Times* tells how a cheap map may be made by any one having a knack for drawing, even in the rudest way, for use in schools.

Procure a common paper window shade having one side plain white or some very light color. If one shade is not wide enough, paste two together. In this way you can have your map of any size you want under seven feet square. Now procure from any Bible atlas, or elsewhere, a small map of the country

you want to exhibit, no matter how small the map may be. Provide yourself with a pair of compasses (or dividers), an iron square, a lead pencil and a straight-edge, half a dozen different colored crayons and you are ready for work.

How to Draw the Map.—Tack your paper shade to a smooth wall (white side out, of course). With your straight-edge, square and pencil, draw the outer lines of your enlarged map in the same proportions that the small map has. With your compasses space off the small map both ways in spaces of about one inch, forming squares. Space off the large map with the same number of squares as are contained in the small one, and you have the foundation for your new map.

We will suppose you want a map of Paul's travels. Notice in the small map the *square* which the northeastern point of the Mediterranean Sea is in; begin at the same point in the corresponding square of the large map, and trace with pencil the outline of that sea. It is not essential that all the minute irregularities of the coast (especially around the *Ægean* Sea) be strictly followed.

Next draw the outlines of the Black Sea, beginning at a given point in one of the squares of the large map corresponding with the same square in the small map. Then locate the islands of Cyprus, Crete, Sicily, etc., being all the time guided by the corresponding squares in the two maps. Run the lines dividing the countries. Locate and name the places mentioned in the lessons—no others are needed.

Now with a dark crayon follow the pencil lines and trace the sea coasts. With a dark blue crayon trace a line just inside of the dark line. Take a light blue crayon about an inch long, and with the *side* of it make a wide line inside the dark blue. Then with the ball of the finger rub over these lines, and they will blend together, forming a beautiful border for the sea coasts.

Having gone thus far you will have learned enough to finish your map to suit your own taste. For lettering, use a camel's hair pencil and writing ink. Tack or paste a strip of wood to the top and bottom of your paper shade, and your map is ready to hang up in the school room.

How to Mount a Map.—Cut the backing muslin, which should not be too heavy, a size larger than the drawing or map, wet it with fresh water, stretch it out well, tacking the edges lightly round the board or floor, so as to keep it flat as possible; then, while it is damp, go over it evenly with the paste, dabbing it and rubbing it in well with the brush, but at the same time not too thickly. Next damp the chart thoroughly with a sponge on the back; when it looks dull, roll it up on a clean map handle or round ruler, press the outer edge firmly down on one end of the pasted muslin, unroll the remainder evenly along the muslin, smoothing it down as you go with a clean, soft, dry cloth; go carefully round the edges, pressing all down; should any air bubbles get between prick them with a strong needle, and press the spot down immediately.

Let the whole become gradually and thoroughly dry before you remove it from the stretch ; when it is, cut the linen even with the edges, and have them bound round with narrow crimson or blue ribbon. With some large drawings or maps, that are on extra strong paper, a narrow strip of linen pasted round the edges on the back will be sufficient.

MANAGEMENT OF CLOCKS.

How to Clean a Metal Clock.—Dip a feather into common paraffine oil, such as is used for lamps, and touch all the oily places of the clock, especially axles and holes ; then let the clock stand a few hours, give more paraffine, and touch oftener if you think it is better for it. Afterward strew strong washing powder among the wheels, etc., and plunge the clock into a strong solution of the same in boiling water.

Let it lie therein till the water gets cool enough to place your hands in, when, with a tooth brush rubbed with soap, wash out the dirt from the works. Afterward cleanse completely from all trace of soap and powder in plenty of warm water, and the operation is complete, the clock not having required to be taken to pieces at all.

Many an old clock could be cleaned by this method, which, if taken apart even by skilled hands, would never tick again, owing to a change in a portion of the wheels when being placed together again.

How to Make a Simple Alarm Clock.—Take a common weight clock and have a small hole in each of the boards that support the works inside, in any convenient place near the hammer. Having attached a small wire or string to the wire that makes the clock strike in regulating, pass it through the holes and under the time weight, through another hole in the case to the outside, where, having secured it, you have an alarm clock that was never intended as such.

The time weight in descending will press on the string and make the hammer strike until the whole weight runs down. To set the alarm, the time weight must be gauged in winding, as it descends about one half inch in three quarters of an hour. It will wake a person without frightening him, which some other alarms will not do.

How to Level a Clock.—A clock can be placed in a position very nearly level by noting the swing of the clock door. The door should work easily upon the hinges to make the test. If the clock leans to the right the door will, when set straight front, swing clear open of itself. If the clock leans to the left, or backward, the door will shut of itself. If it leans front, the door

will remain half open. When the clock is level, the door will remain as readily in one position as another.

A very cheap and readily made level cord consists of a large rifle ball or piece of lead, with a linen or silk thread attached.

Separating and Cleaning.—When taking a clock to pieces to clean, note well how the pieces go together before separating. First, touch watch oil to the pivots, and run the wheels to loosen the dirt. Tie the springs with strong cord, loosen the click spring, and let them down steadily by the key turning in the palm of the hand. If the two largest wheels of the trains are alike, mark the strike side, that there may be no mistake in putting together. Wipe thoroughly every part of the works with a clean rag.

If the clock is old, scrape with a sharp knife; polish the pivots if at all rough or worn, and clean with a clean rag pressed well against the shoulder with the thumb nail. The pivot holes, if the pivots are worn rough, should be lightly scraped with a sharp reamer, and cleaned with a pine stick till they no longer blacken it.

HOME MADE BAROMETERS.

German Barometer.—A German communicated the following to a London paper: Take a common glass pickle bottle, wide mouthed; fill it within three inches of the top with water; then take a common Florence oil flask, removing the straw covering and cleansing the flask thoroughly, plunge in the neck of the flask as far as it will go, and the barometer is complete. In fine weather, the water will rise in the neck of the flask even higher than the mouth of the pickle bottle, and in wet, windy weather, will fall to within an inch of the mouth of the flask. Before a heavy gale of wind, the water has been seen to leave the flask altogether at least eight hours before the gale came to its height.

A Gardener's Barometer.—Dissolve two and a half drams camphor in eleven fluid drams of alcohol. Put thirty-eight grains of nitrate of potash (saltpeter), and thirty-eight grains of muriate of ammonia (sal ammoniac), into nine fluid drams of water; when all are perfectly dissolved, mix the two solutions. Shake them well in a two ounce or four ounce white glass vial, cork very loosely, or, better, tie over the mouth a piece of linen or cotton cloth, and place the instrument in a good light, out of the sunshine, where it can be observed without handling.

When the weather is fine and clear, the fluid is also; but on the least change, the chemicals, which lie as a sediment, rise, in beautiful frond-like crystals, proportionately and again duly subside. By watching these changes one soon be-

comes able to predict the changes probable for a few hours to come in any locality ; so says the *Journal of Chemistry*.

This instrument is also a pretty philosophical toy, showing how sensitive some chemical solutions are to atmospheric influences.

A Paper Barometer.—There is a cheap and very ingenious barometer described by a scientific journal, made of paper. It is recommended particularly to farmers: Take two sheets of pasteboard paper of any convenient size—say three feet long and two feet wide. Bring the ends together, and glue or paste them tight, each sheet by itself, and they will look like two pieces of paper stove-pipe. Cut thin round boards exactly to fit in the ends of these paper cylinders. Tack the heads in and paste or glue them air tight.

Now you have two air tight paper drums with wooden heads. Take a pole of any length you desire—three feet or twelve feet—let one drum be fastened to each end of the pole. Now balance this pole with the drums on each end, on nice pivot, in the middle. Then bore a gimlet through the end of one drum, and you have a good farmer's barometer. One has a hole in it, so there will be more or less air in one drum than there is in another, according as the surrounding air is dense or rarefied.

Consequently, in dense or heavy air, the tight drum rises, while the one with the pinhole in it goes down. Crosswise through the middle of the bar or pole should run a stick as large as one's finger, a foot long, with wire gudgeons, on which the instrument should vibrate or teeter.

Let the ends of the pole be slightly lower than the middle, that the whole does not make a somersault ; smear all with glue or oil, so that no air enters save in the puncture mentioned.

Have something you can slide through the bar, to keep it nearly level. Mark, if you please, figures along the pole, to show how far you have moved the balancing poise, though for this there is but little need. This instrument may not be so perfect as a costly barometer ; but for all practical purposes it is all one could ask.

THE RAZOR AND ITS USE.

Honing a Razor.—Shaving one's self is not an agreeable job at the best, and no man should ever attempt it with a razor of inferior quality, or one in poor condition. One method of sharpening a very dull razor is to put it for half an hour in water, to which has been added one-twentieth of its weight of muriatic or sulphuric acid ; then lightly wipe it off, and after a few hours set it on a hone. The acid here supplies the place of a whetstone by corroding the

whole surface evenly, so that nothing further than a smooth polish is necessary. The process, it is claimed, never injures good blades, while badly hardened ones are generally improved by it, although the cause remains unexplained.

I have never tried the above process, and am satisfied with the use of a good hone and strop. For dressing down, use a fine Turkish stone perfectly clean and a good quality of olive oil.

The blade of the razor is concave. The wedge-like edge extends in its bevel but a little way back. In honing a razor the fingers should feel the back as well as the edge blade bearing; the back protects the edge. The motion should be the same as in honing a knife blade, circular. Few can hone a razor properly on the first trial, but a little practice with the points mentioned in view, will enable one to do it as well as a barber.

Stropping a Razor.—It is as important that the strop be of first quality as that the razor be of best material, for a good piece of steel cannot be brought down to a fine edge without the strop is a number one article. If soft, the leather rises suddenly as the edge passes over it and undoes what has just been done.

It must be remembered that the edge of a razor that will cut a hair is very delicate. A blade should be drawn from heel to point, starting at the heel and drawing it diagonally to the point, and should be always turned on its back. Do not strop too much. A few strokes across the leather may put on a fine, keen edge, when the addition of twenty more feather it up and destroy the cut.

How to Renew a Strop.—Rub it over, lightly, with a little clean tallow, and then put upon it the top part of the snuff of a candle, which, being a fine powder, will admirably supply the place of the best composition ever used for the purpose. Another mode of renovating a razor strop, recommended, is by rubbing it well with pewter, and impregnating the leather with the finest metallic particles.

How to Use a Razor.—Previous to shaving, wash the face thoroughly with warm soap and water. If the beard is stiff and hard and the skin tender, spend considerable time in lathering and rubbing the cheeks and chin with the hand. Before applying the razor to the face, dip it into warm water and hold it there a few seconds.

When shaving, do not scowl, and keep the razor very nearly flat upon the face, and give it a gliding or circular motion, that is, slightly, as the beard will cut much easier than when the edge is pushed squarely against it. Strop a little after finishing to assist in making the razor perfectly dry to be put away.

Cleaning a Razor Strop.—The honing side of a razor strop sometimes becomes glazed so that it will not take hold of the steel. To remove this, I have used various liquids, such as soap suds, alcohol alone and alcohol and glycerine mixed, but have found nothing to equal a diluted solution of ammonia. A wet rag with the ammonia bottle tipped against it, will clean the hone.

GENERAL MISCELLANY.

To Take Impressions of Coins.—Melt a little isinglass glue with brandy, and pour it thinly over the metal, so as to cover its whole surface; let it remain on for a day or two, till it is thoroughly dried and hardened, and then taking it off it will be fine, clear, and as hard as a piece of glass, and will have a very elegant impression of the coin. It will also resist the effects of damp air, which occasions all other kinds of glue to soften and bend if not prepared in this way.

How to Harden a Poker.—The fire poker, by constant use, becomes soft, and is generally more or less bent. This arises from its being left in the fire and becoming red hot, then being put on the fender, where it slowly cools—an operation which softens even the best steel. When the poker has thus become soft and bent, it may be again hardened by making it hot two or three times, and plunging it every time that it is heated into a pail of cold water.

To Make Matches Water-proof.—It is said that friction matches can be made perfectly water-proof under any circumstances, by dipping them, when completed in the ordinary way, in a solution formed by adding two parts of glycerine to one hundred of collodion.

How to Mend a Kettle.—Holes in the bottom of iron kettles may be stopped by driving in plugs of lead and heading them down on both sides of the iron. So long as water is in the kettle the lead will not melt. A cement said to be good is made by mixing six parts of well pulverized, dry clay and one part iron filings; make into a paste with boiled linseed oil.

A Cheap Gilding.—By rubbing a metallic surface with soda amalgam, and pouring on a solution of chloride of gold, gold is taken up by the amalgam, and it is only necessary to drive off the mercury by heat to obtain a gilded surface that will bear polishing.

To Improve Gilding.—Mix a gill of water with two ounces of purified niter, one ounce of alum, and one ounce of common salt; lay this over gilt articles with a brush, and the color will be much improved.

To Make Writing Look Old.—Take one dram of saffron, and infuse it into one-half pint of ink, and warm it over a gentle fire, and it will cause whatever is written with it to turn yellow, and appear as if of many years standing.

How to Make Pewter.—This metal is made by mixing twenty parts of tin with eight parts of lead.

To Take Tin from Copper.—Tin can be removed from copper vessels very thoroughly by immersing the objects in a solution of blue vitriol.

To Sharpen a Hoe.—Screw the shank in a vise, and with a flat saw file bevel the side of the edge next the handle.

Lacing for Sewing Machine Belts.—An old kid glove makes excellent lacing for securing small belts on sewing and other machines. Cut the glove into strips half an inch wide, and roll them up tight.

To Mend Rubber Hose.—Cut the hose apart where it is defective; obtain a piece of a shot gun barrel or iron pipe ten or twelve inches long; force the hose over it until the ends meet, and wrap with strong twine well waxed.

To Prevent Boilers Corroding.—Protzen recommends the introduction of a piece of zinc into a boiler. This determines a galvanic current which protects the iron against oxidation and corrosion, and causes the mineral ingredients of the water to be deposited as a fine, loose mud, entirely preventing the formation of a "crock."

To Prevent Plaster of Paris Hardening.—It is often desirable, in using plaster of Paris, in the ordinary way, to prevent its hardening too rapidly. This may be easily done by adding a saturated solution of borax to the water in suitable proportion. One volume of the solution to twelve of water will prevent hardening for fifteen minutes; while with equal parts this will not take place for ten or twelve hours.

To Detect Escaping Gas.—It is usual to detect gas escapes by applying a lighted taper or candle to the suspected place of leakage. A safer mode is as follows: Mix soap and water in the proportion of two pounds of the former to five or seven pints of the latter. The sticky liquid so obtained is ready to be applied with a brush to the gas pipe, when, if an escape is taking place, bubbles will readily be seen on the liquid, and the position of the escape indicated without any danger.

Gypsum Dominos.—It is said that gypsum, mixed with four per cent. of powdered marshmallow root, will harden in about an hour, and then can be sawed or turned, and made into dominos, dice, etc. With eight per cent. marshmallow the hardness is increased, and allows of its being rolled out into thin plates and painted or polished.

To Make Modeling Clay.—Knead dry clay with glycerine instead of water, and a mass is obtained which continues moist and plastic for a length of time. This removes one of the greatest inconveniences that is experienced by the modeler.

Alloy for Models.—A good alloy for making working models is four parts copper, one part tin, and three fourth parts zinc. This is easily wrought. Doubling the proportion of zinc increases the hardness.

How to Soften Resin.—Melt the resin, and while in a state of fusion add tar. The proper degree of hardness can be ascertained by dropping a small portion of the melted mass into water.

Alloy for Bells.—Alloy celebrated for its bright color, like German silver, and its high, clear sweetness of sound, is made of 18.22 copper and 16.76 tin. When properly cast and smoothly turned, this furnishes a renowned bell.

Chalk for Rubber Joints.—In making rubber joints always chalk the approximating surfaces, as, no matter what heat they are exposed to, they will always readily separate afterward.

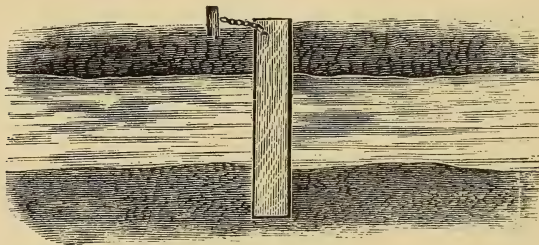
To Button a Stiff Collar.—Well laundered collars and cuffs are too stiff to button without considerable trouble. They may be instantly made pliable at the button hole by touching the tongue to that spot.

To Stop a Mouse Hole.—Use plugs of common hard soap, and you will do it effectually; rats, roaches and ants will not attempt to get through it.

Cleaning Gutta-percha.—This can be done by using a mixture of soap and powdered charcoal, polishing afterward with a dry cloth with a little charcoal on it.

Filling Cracks in Ceilings.—Whiting mixed with glue—water or calcined plaster and water, makes a good putty for filling cracks in plastered ceilings.

A Freshet Bridge.—Sometimes trouble arises from foot bridges over small streams being carried away by freshets. To obviate this, use a single



CHEAP FRESHET BRIDGE.

plank with the end next to the house, or side of approach, fastened to a stake by a piece of chain, as illustrated. When the rush of water comes, the plank is swept around and is ready to be replaced. To put the plank across, raise it on end and let it drop to the opposite bank.

To Harden Wooden Pulleys.—Boil the pulley for about eight or ten minutes in olive oil, then let it stand in a warm place for a few days before using.

How to Bleach Sponge.—Soak the sponge well in diluted muriatic acid for twelve hours. Wash well with water, then immerse it in a solution of hyposulphite of soda, to which dilute muriatic acid had been added a moment before. After it is bleached sufficiently, remove it, wash again and dry it. It may thus be bleached almost snow white.

Sizing for Sign Work.—One of the best sizings for sign work is made by exposing boiled linseed oil to a strong heat in a pan; when it begins to smoke, set fire to the oil, allow it to burn a moment, and then suddenly ex-

tinguish it by covering the pan. When cold it will be ready for use, but will require thinning with a little turpentine.

To Clean Stone.—Boil a pound of pipe clay in three pints of water and a quart of vinegar; put in a bit of stone-blue. Wash with this mixture, and when quite dry, rub with dry flannel and a brush of moderate stiffness. Sweep off the fine dust thus raised with a clean hand brush.

To Tin Metallic Articles.—Plates, or vessels of brass, iron or copper, boiled with a solution of stannate of potassa, mixed with turnings of tin, become in the course of a few minutes covered with a firmly attached layer of pure tin. A similar effect is produced by boiling the articles with tin filings and caustic alkali, or cream of tartar.

Uniting Lead and Zinc.—These two metals do not really unite. When melted together and allowed to cool slowly, the lead falls to the bottom. If kept together in fusion and repeatedly stirred, the zinc sublimes with great rapidity.

To Mend a Water Pot.—When a water pot rusts through where the sides join the bottom, it is not necessary to throw it away, as the holes may be effectually stopped without going to the tinker's, by covering them inside with a small piece of linen dipped in copal varnish, the tin being previously thoroughly dried. When the varnish hardens by drying, they are perfectly water-tight.

Alloy for Journal Boxes.—Twenty-four pounds of copper, twenty-four pounds of tin and eight pounds of antimony. Melt the copper first, then add the tin and lastly the antimony. It should be first run into ingots, then melted and cast in the form required for the boxes.

To Keep Sails from Mildewing.—To treat sails so that they will not mildew, impregnate with strong, hot soapsuds, press out the excess and immerse in strong alum water, or in weak lead acetate solution; rinse, and repeat the soap if necessary.

To Remove Finger Marks.—Ammonia will remove finger marks from paint, where there would otherwise have to be a good deal of scrubbing with soap, which takes the paint off also.

How to Burn Lime.—Place a layer of wood six or eight inches thick (or deep) on the ground, leaving arches about four feet apart, formed by laying two pieces of timber ten or twelve inches apart, and then laying a flat piece on top of them, extending from side to side of the kiln. On this foundation put a layer of coal, say six inches thick; then a layer of lime stone eight or ten inches thick; then another layer of coal alternately until all is on; then cover with dirt, and keep covered all but a little at the top for ventilation. Use one bushel of coal to two of lime stone. The arches are for starting the fire. After the fire is well started, close the arches with clay.

To Test Coins.—The best test for a suspected coin is to weigh it against a piece which is evidently genuine. The instrument called a "detector," used

for bending coin, does not prove that a coin is not genuine; neither does "ringing it," for genuine coins may be easily rendered "dumb" by a crack. Counterfeit silver coins are most easily detected through the difficulty of imitating the "milling" or "lettering" on the edge.

To Marble the Edge of a Book.—Dissolve four ounces of gum arabic in two quarts of clear water; then provide several colors mixed with water in pots or shells, and with pencils peculiar to each color, sprinkle them by way of intermixture upon the gum water, which must be put into a trough, or some broad vessel, then with a stick curl them or draw them out in streaks to as much variety as required.

Having done this, hold the book or books close together and only dip the edges in on the top of the water and colors very lightly; which done, take them off, and the plain impression of the colors in mixture will be upon the leaves; doing as well the end as the front of the books in the same manner.

Minstrel Powder.—To make blacking for the face to be used in minstrelsy, collect a few corks, cut them in small pieces, dip each piece in alcohol and put it in an iron kettle. After all are dipped, touch a flaming taper to the pile and it will burn down to black ashes. Sift through a wire sieve and wet the dust with stale beer or water, into a thick paste, and put this in a tin box for use. To black up, take a little of the paste in the palm of the hand and wet it a little, rub and apply as if washing the face. It will give a glossy black that can be removed by soap and water. Beer, for mixing the paste, gives more gloss than water.

Sawdust for Drilled Iron.—Irons that have been drilled or operated upon in any other way where oil is used, should be placed in a box of sawdust of non-resinous wood and be well rubbed. This will absorb the oil and save much trouble and expense in filing. The sawdust should be changed, as it soon becomes dirty. Blacksmiths will find a box of this material standing near their forge a convenient and profitable thing.

Newly Sawed Boards.—Do not allow newly sawed boards to lie spread upon the ground at home or at the mill. Put them up with sticks when they first leave the saw, or a portion will be spoiled by warping.

Brace for a Kicking Horse.—Take a forked stick about two feet long, varying a little according to the size of the horse, tie the fork firmly to each end of the bridle bit, and the other end of the stick to the lower end of the collar, so as to keep the head up, and this will prevent his kicking. A few days working in this manner will commonly suffice to effect a cure. Horses are more apt to kick when turning in plowing or harrowing than any other time, from the tugs chafing the legs.

To Make a Snow Shovel.—Take a hard piece of half inch lumber about a foot wide and seventeen inches long, and plane down at one end until a rounding edge is formed, then upon the back end screw a piece of tough wood

three quarters of an inch thick, five inches wide, and as long as the board is wide. In the center, from end to end, and well up toward the top edge, bore a hole slanting downward and forward, so that the handle when passed through the hole will strike the board five or six inches in front of the cross piece. Bevel the end of the handle to fit the shovel board, and fasten it with a staple or a screw driven up through the board into the handle. The handle should be long enough to work without stooping, and the whole thing should be as light as possible.

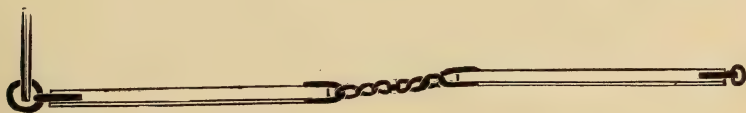


HOME MADE SNOW SHOVEL.

Fancy Ash Receiver.—Make the frame of wood of any pattern desired, line it with tin, fasten a strong copper wire across the top, and cover the outside with spruce or other limbs, put on in a rustic fashion.

How to Make a Tether.—To make a tether that will insure safety, take two light, dry poles or strips of plank eight and ten feet long; connect these poles by a chain of a few links, the middle link having a swivel such as is common in trace chains. At the end of each pole is a piece of iron in the form of a loop, embracing two sides of the pole and projecting a little beyond the end, in which a link of each end of the chain is fixed.

At the other end of the long pole is attached a ring, two inches in diameter, by a similar loop. This end is staked down, the ring allowing it to run freely around the stake.



CHEAP AND EFFECTUAL TETHER POLE.

At the other end of the short pole is attached a smaller ring by a similar loop, to which a halter is tied until the horses become accustomed to it. After a time a collar around the neck of the horse will answer.

Test for Gold and Silver.—One test for gold and silver is a piece of lunar caustic. Slightly wet the metal to be tested and rub it gently with the caustic. If gold or silver, the mark will be faint; but if an inferior metal, it will be quite black.

How to Silver Ivory.—Immerse a small slip of ivory in a weak solu-

tion of nitrate of silver, and let it remain until the solution has given it a deep yellow color; then take it out and immerse it in a tumbler of clear water, and expose it in the water to the rays of the sun. In about three hours the ivory acquires a black color, but the black surface on being rubbed off soon becomes changed to a brilliant silver.

Tempering Steel Tools.—Different tools need to be tempered differently, as different degrees of hardness are required for different purposes, and the degree of heat for each of these, with the corresponding color, will be found in the annexed table. Very pale straw color, 430 degrees, the temper required for lancets. A shade of darker yellow, 450 degrees—for razors and surgical instruments. Darker straw yellow, 470 degrees—for penknives. Still darker yellow, 490 degrees—chisels for cutting iron. A brown yellow, 500 degrees—axes and plane irons. Yellow, slightly tinged with purple, 520 degrees—table knives and watch springs.

To Prevent Boiler Scales.—Many substances are employed for the purpose of preventing the formation of scales in boilers. Among these, which act chemically, are soda ash, chloride of barium, carbonate of ammonia, chloride of ammonia, and tannin or extract of oak bark.

Fastenings of Belts.—A belt, to run evenly and steadily, should have but one lace joint. The ends of the leather should come together at right angles with the sides. The laces should not be crossed on the inside; and care must be taken to put them in evenly and of equal strength at the two edges of the belt.

In case rivets are employed, the heads should be let in on the inside surface of the belt, so as to leave no obstructing points to come in contact with the pulley, the washers being placed on the outer surface.

Uses for Pumice Stone.—Pumice stone in lump is excellent for scouring wood in finishing work; for domestic scouring, for reducing corns on the feet, and in powder, it is the best material for scouring down varnish, and no one need have rough and dirty or stained hands, who will use it when required.

To Bronze Plaster Casts.—To make a good green bronze, such as is used for French statuary, dissolve one ounce sal ammoniac, three ounces cream tartar, six ounces common salt, in one pint of hot water; add two ounces copier nitrate in a pint of hot water. Mix well together, and apply with a brush.

Aniline Bronzing Fluid.—Take ten parts of aniline red and five of aniline purple, and dissolve in one hundred parts of alcohol at 95°, taking care to help the solution by placing the vessel in a sand or water bath. As soon as the solution is effected, five parts of benzoic acid are added, and the whole is boiled from five to ten minutes, until the greenish color of the mixture is transformed into a fine, light colored bronze. This bronze is stated to be very brilliant, and to be applicable to all metals, as well as to other substances. It is easily laid on with a brush, and dries promptly.

Beautiful Black Color for Bronze.—A strong, concentrated thin solution of nitrate of silver is required for this purpose. It should be mixed with an equal solution of nitrate of copper, and well shaken together. The pieces which require coloring are dipped into this solution and left for a short time. When taken out, they should be equally heated till the required black color makes its appearance.

Running Balance of Mill Stones.—The *Miller's Journal* says that you should first put the stone in standing balance, and then put two one-half inch boards between the burrs, and turn the runner off as true as possible. Now take out the two boards, and run the stone up to its regular speed, and with a pencil steadied by the same rest used in turning off the stone, pencil the top of the stone, which will show you the side that raises. Add lead on that side next the band till the pencil touches evenly all around.

Of course the burrs are out of standing balance. Now find the amount of lead requisite to put it back in standing balance, and put it in, one-half above and one-half below the line, straight and level with the cock-head and opposite the lead used in getting the running balance. The burrs are then in both standing and running balance.

To Mend a Steam-Pipe.—A correspondent of the *Scientific American* says a pipe may be mended so that it will stand both heat and water by a mixture made of glycerine and enough litharge to form a paste as thick as putty. Use while soft.

Use of Stucco.—This substance, much in use for walls, pillars, etc., is at present prepared by mixing plaster of Paris with a solution of gelatine or glue, instead of with water. This, while stiffening more slowly, becomes much harder than with water alone.

When the mass has been suitably applied, and sufficiently hardened, the surface is to be moistened and rubbed down with pumice stone until smooth. It is finally to be coated by means of a brush with a concentrated solution of gelatine, and when perfectly dried, it may be polished with tripoli on a buffer.

To Mend Iron Shafts.—Shafts of cast iron may be mended, when broken, by pouring on melted iron to form the part required, the pouring being continued with a surplus of metal until the new parts are fused upon the old.

How to Make a Tethering Screw.—Take a piece of iron rod about two feet long, pointed at one end and twisted at that end into one or two corkscrew spirals. The other end is bent to form an eye that will admit a stick like a piece of broom handle, and also large enough to hold the ring on the end of the tethering chain close to the ground. When made, it is about fifteen inches long. It may be easily screwed down into the earth, but cannot be drawn out by the tethered animal.

How to Split Cast Iron.—Large masses of cast iron may easily be split by drilling holes in them, and filling with water. A steel plug being inserted

as a piston, a short, quick blow with a light steam hammer causes the water to exert a pressure in all directions sufficient to burst the mass. A plate twenty-nine and a half inches thick was thus split like a block of ice; and the pieces flew from twenty to thirty feet by the immense force.

Cheap Ash Sifter.—Take an old flour barrel, bore two holes eight inches from the top and eight inches apart through the staves, then two more directly opposite. Use a three-quarter auger and drive in old broom handles. This makes a platform for the sieve to rest upon. Next, cut out a piece of stave on one side between the holes and above them for the sieve handle to work in. Fit a board over the top for cover, and the thing is complete.

To Make Deep Gold Lacquer.—Seed-lac, three ounces; turmeric, one ounce; dragon's blood, one-fourth ounce; alcohol, one pint; digest for a week, frequently shaking, decant and filter. Lacquers are used upon polished metals to impart the appearance of gold. If yellow is required, use turmeric, aloes, saffron, or gamboge; for red, use annotto or dragon's blood to color. Turmeric, gamboge and dragon's blood generally afford a sufficient range of colors.

To Preserve Flower Stakes.—Take common coal tar and bring it to the boiling point in a kettle some twelve inches deep; place the lower part of stakes in the boiling tar, immersing them as deeply as the pot will allow. After they have remained therein about ten minutes, take them out, allow the surplus tar to drain off, and roll the hard portion in clean, sharp sand, covering every part of the tar. After they have become perfectly dry, give them another coat of tar, completely covering the sanded part.

To Make an Æolian Harp.—Of very thin cedar, pine, or other soft wood make a box five or six inches deep, seven or eight inches wide, and of a length just equal to the width of the window in which it is to be placed. Across the top, near each end, glue a strip of wood half an inch high and a quarter of an inch thick, for bridges.

Into the ends of the box insert wooden pins, like those of a violin, to wind the strings around, two pins in each end. Make a sound hole in the middle of the top, and string the box with small cat-gut or blue first-fiddle strings.

Fastening one end of each string to a metallic pin in one end of the box, and, carrying it over the bridges, wind it around the turning pin in the opposite end of the box.

The ends of the box should be increased in thickness where the wooden pins enter, by a piece of wood glued upon the inside. Tune the strings in unison and place the box in the window. It is better to have four strings, as described, but a harp with a single string produces an exceedingly sweet melody of notes, which vary with the force of the wind.

To Protect Fruit from Birds.—Take a ball of brown thread, fasten the end of it to one of the twigs of the tree or bush, and then cross the thread

backward from twig to twig in perhaps a dozen different directions, fasten, and the thing is done; and it will last two years. The birds come boldly to settle on the trees and they strike against these, to them, invisible snares, and they fly off in a terrible hurry, not to return again.

A Cheap Lactometer.—A cheap milk tester may be made by getting a glass bulb and stem, both hollow, and loading the bulb with shot until the instrument will float upright in pure milk. Mark on the stem the point to which it sinks—the surface point. Remove it from the milk and float it in pure water, marking the surface point as before, which will be considerably higher on the stem than the other mark. Now take a narrow slip of paper, capable of being rolled lengthwise, and insert it in the stem of the instrument so that the figures on it will be visible through the glass.

Lay off on this, in the direction of its length, a space equal to the distance between the two surface points, numbering the one 0 and the other 100. Subdivide this space into ten or twenty proportional spaces, correspondingly numbered; roll the slip and insert it in the stem until the 0 is at the surface point of the milk, the 100 at the point of the water. Your lactometer is now complete.

Float it in your milk can every morning, and the depth to which it sinks will register the percentage of dishonest water, if any, the milk contains.

Care of Large Bellows.—The cause of holes in the bellows, unless they are punctured from carelessness, is due to friction only. The bellows is never cleaned from the time it is put up until it becomes necessary to send it away for repairs.

The oil used in the process of currying causes the small particles of dirt, dust and cinders, which are continually moving about the smithy, to adhere to the leather, and every time the bellows is manipulated these little particles do just so much grinding or cutting of the leather, until there is a small hole formed.

The bellows ought to be cleaned on the outside thoroughly once a week, or as much oftener as the time of the helper will permit. The leather of the bellows never ought to be oiled, unless it is placed in a position to be attacked with mildew, and when oiled ought to be cleaned often.

Pruning Rose Bushes.—Upon those rose bushes that bloom but once a year—summer roses as they are called—it is best to prune pretty severely as soon as the period of blooming is over, unless it should be very dry, in which case defer pruning until just as the fall growth begins. By this course abundance of young spurs or shoots, for flowering the next season, are produced.

Approximate Strength of Metals.—A bar of cast lead, one inch square, breaks under a strain of 860 pounds; a bar of cast gold of similar dimensions will break under a strain of 22,000 pounds; a bar of cast silver will not break until the strain reaches 44,500 pounds; a bar of cast iron will remain intact until the strain exceeds 59,000 pounds; the best wrought iron will bear

a weight of 84,000 pounds to a bar an inch square; and a similar bar of steel has been made of such tenacity as to lift 150,000 pounds before breaking.

Cheap Burglar Alarm.—It is simply a little brass wedge with a small piece of the same metal attached to its sloping side. The wedge has only to be pushed from the inside, between the closed door and the door sill. No other fastening is necessary, as any attempt to open the door only tightens the wedge. A percussion cap may be inserted between the wedge and the piece of the metal riveted upon it; the slightest attempt to force the door will explode the percussion cap and frighten the intruder.

This style of wedge may be made of hard wood, with a little piece of tin riveted on, under which to place the torpedo. In this case, the tin should begin low down at the sharp end of the wedge, so as to protect it.

A hole may be bored in the wedge so that it may be temporarily secured to the floor (with a nail or pocket gimlet), about three inches in front of the door. In this way, any attempt to open the door is sure to meet with failure and detection at the same instant.

How to Build a Corduroy Road.—"In marsh or bog lands," says Mr. Nicholl, "first lay all small poles or brush transversely and across the road; next take long trees—the smallest ends being at least of ten inches diameter—and lay them longitudinally along on these poles and brush, in two rows, eight feet apart from center to center, making the ends at the junction of each piece lap each other, at least three feet, breaking joint on either side and placing under these ends large logs, of sufficient length to extend across the road, and two feet on each side of these stringers.

"Cover these stringers with transverse logs, twelve feet long from scarf to scarf, and at least ten inches in diameter at the smallest end, fitted close together, on the straight portions; the logs alternated with a large and small end; and on the outer side of curves all the large ends, which will assist in the curvature of the road and the gravity of the vehicles. Next adze off the center ridges of these logs to a face of about five inches for the width of nine feet in the center of the roadway, and cover this nine feet with gravel to fill in between the logs and give a smooth surface."

Care in the Green House.—Many persons having charge of green houses, the propagation of vines, plants, etc., make the destructive blunder of getting up too much heat, early in spring. Bottom heat is desirable for cuttings, and it may range from 80 to 100 degrees without loss, provided air is given to the surface, not less than 15 to 20 degrees below that point.

Plants, like geraniums, roses, etc., in the ordinary green house, should have no heat above 60 deg. ranging through the house, and it should be down to 45 or 50 at night. Too much and great heat until almost, if not quite, April, gives a spongy, sickly condition to the plants, so that they are, for outdoor planting, in May, but little better than cuttings.

Substitute for Fire Brick.—When the fire bricks of a stove have burned away, a very good substitute may be used until new bricks can be obtained. Mix one part of salt with two parts of coal ashes, wetting with water. Apply this to the inside of the stove in the place of the fire brick. It hardens in a few hours, and answers a very good purpose. Cracks in stoves may be mended the same way, or the bottoms of well worn ash pails and coal buckets.

Enamel for Copper.—The beautiful enameled surface may be produced, on a black ground, by the following process: Clean the copper with sand and sulphuric acid, and then apply the following mixture; two parts of white arsenic, four parts of hydrochloric acid, one of sulphuric acid, and twenty-four of water.

Bronzing Copper Urns.—The surface, first made thoroughly clean and bright, is covered with a thick coat of rouge and water; when dry, the article is placed in a clear hollow fire (say a chamber of bricks, red hot), for a short time, until the rouge has turned to the desired shade of color. Then the article is placed on a suitable stand, and polished with a soft brush and rouge powder, and afterward with soft leather. The tinning and soldering are subsequent operations.

To Clean all Sorts of Metals.—Mix half a pint of refined neat's-foot oil, and half a gill of spirits of turpentine. Scrape fine a little rotten stone, wet a woollen rag, dip it into the scraped stone, and rub the metal well. Wipe it off with a soft cloth, and polish with dry leather.

How to Weld Copper.—According to a German writer, copper may be welded perfectly by means of a powder, consisting either of pure salt of phosphorus, or of a mixture of this with boracic acid. The latter is cheaper, but does not give quite so fluid a slag as the former. The welding powder is to be scattered over the copper after being brought to a red heat, and then heated to a cherry red, or to an incipient yellow glow. The combination of the parts, when hammered together, is at least as perfect as that of iron.

To Protect Lead Pipes.—Plaster of Paris offers the best protection for lead pipes. Wherever lead pipes pass through a wall they should be laid in gypsum, over which mortar or cement can then be safely laid.

Lime Scales in a Feed Water Pipe.—A correspondent writes: "Having been very much annoyed by the choking up of lime scale in the feed water pipes to a stationary boiler, and having burst several of them while trying to bore out and beat out the deposit, which was almost as hard as marble, I thought of a new remedy, which proved to be completely successful. A can of refined coal oil was standing near where we were working, and, plugging up one end of the pipe, half a pint was poured in and shaken about till the scale seemed to be saturated with it. The remainder of the oil was then poured out, and on knocking the pipe the contents slid out round and solid. The oil seemed to destroy its connection with the metal altogether.

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Protecting Water Pipes in Winter.—In pumping up water into the cistern for the water-closet, be very particular in winter time. Let all the water be let out of the pipe when done; but if this is forgotten, and it should be frozen, take a small gimlet and bore a hole in the pipe, a little distance from the place where it is let off, which will prevent its bursting. Put a peg into the hole when the water is let off.

When the frost begins to set in, cover the exposed water pipes with hay or straw bands, twisted tight round them.

Strength of Ropes.—A good rope, one inch in diameter, will bear, it is estimated, about 5,000 lbs., but should not be subjected to more than half this strain.

Wire rope is more than twice the strength of hemp rope of the same circumference; splicing a rope is supposed to weaken it one eighth.

The strongest description of hemp rope is untarred, white, three stranded rope; and the next in the scale of strength is the common three strand, hawser laid rope, tarred.

To Mold a Face in Wax.—Take a pound of new wax, a third of colophony; melt them at a slow fire; let the substance cool until you may endure some of it on your hand without burning it; then having oiled the face with olive oil, cover the hair of the eyelids and eyebrows with paste; then with a brush nimbly cover the face about the thickness of a quarter of a dollar, being careful not to stop the nostrils, and that the person does not squeeze his eyes together, because that will render the face deformed.

Thus, having the face of wax, take it off gently and strengthen it with clay on the back side, that it may not give way. After this manner you may cast all sorts of faces—laughing, weeping, grimaces or wry faces.

To Use the Siphon.—The siphon is a round tube bent in a half circle, or nearly so. To use it fill with water and plug both ends; then place one end in a bucket or vessel of any kind filled with water and open the ends. Water will go up hill in traversing the curved tube and continue to flow so long as the supply lasts. Another way to start a small siphon is to place one end while it is empty in the water and start the water running by suction.

The siphon is a convenient thing to empty an aquarium with, as it does not disturb the fishes. Large siphons may be used to bring water from elevated wells to a residence; that is, the siphon brings the water to a point where conducting pipes are laid. By stopping the siphon at the discharge end it will readily start again when the flow is desired.

To Take Impressions of Medals.—Melt a little isinglass glue made with brandy, and pour it thinly over the medal so as to cover its whole surface; let it remain for a day or two, till it be thoroughly dry and hardened, and then, taking it off, it will be fine, clear and hard as a piece of glass, and will have a very elegant impression of the coin.

To Wrap a Pencil.—To wrap a split pencil, pen stalk, or other small stick, take a linen or silk thread, and use the process described under head of the “Binding Knot,” or if it is desired to bind *very* tight, begin by winding over the first end without the loop, then at the conclusion hold the thread firmly under the ball of the left thumb, and cut it off close. After coating the end with mucilage, tuck it under with the dull point of a knife or fork tine, and press it down firmly.

Strawberry Vine Trimmer.—Procure a common chopping knife, such as is used in the kitchen, one having a single standard in the center for handle. Take off the hand piece and put in its place a part of a rake handle, the knife shaft going into the end of the stick. Vines can be rapidly and easily trimmed with this, as one can stand erect to perform the work.



STRAWBERRY VINE TRIMMER.

Lime Stains.—When a house is being plastered, if the floors were previously covered to the depth of half an inch or more with sand, a great deal of extra work in removing stains and cleaning could thus be avoided. Straw, although sometimes used, will not answer the purpose, but sawdust will. When plastering, the wood work is always more or less spattered with lime or water, which it is tedious to remove, unless one knows the easiest way, which has been found to be by rubbing it after it becomes dry with coarse sand paper and then with finer quality; washing is then unnecessary.

Artificial Stone.—Make sand or gravel into a paste with fluid silicate of soda (water-glass), mold it to the desired shape, and dip into a solution of chloride of calcium. This solution is made by neutralizing muriatic acid with lime, chalk, limestone, or marble. The mass becomes solid in a few minutes, and is exceedingly strong and durable.

How to Select Hinges.—A carpenter gives a simple method of selecting right from left handed, loose jointed butts or hinges which may be useful to many, as it has often saved considerable trouble and annoyance in sending inexperienced persons to the stores for such articles:

“Take up the closed hinge from the counter and open it from you, holding it in both hands; if you wish for right handed ones, hold fast with the right hand, letting it go with the left. If the hinge remain intact it is right handed, but if it falls to pieces or apart, it is left handed. Holding fast with the left and letting go

with the right, will prove which is which by a similar test. I have seen many a score of people puzzled to tell one hinge from another, until I showed the above simple plan, when it was a mystery no longer."

The Spring Bow.—The spring bow is simply an elastic stick or a piece of whalebone a foot or more long, with a fine, stout string tied from end to end, so as to bend the bow somewhat. By giving it a cross lap around a drill which has a little pulley upon it, the tool may be worked very rapidly by drawing and shoving the bow. Support the head of the drill under the ball of the left forefinger.

Bricks for Keeping Fire.—Mix coal, charcoal, or sawdust, one part; sand, of any kind, two parts; marl or clay, one part; in quantity as thought proper. Make the mass up wet, into bricks or balls of a convenient size, and when the fire is sufficiently strong, place these bricks according to size, a little above the top bar, and they will produce a heat considerably more intense than common fuel, and insure a saving of one-half the quantity of coals. A fire thus made up will require no stirring, and will need no fresh food for ten hours.

How to See Up a Chimney.—Place in the hole of the chimney wall into which the stove pipe is to go, a piece of mirror inclined at an angle of forty-five degrees. If the observer can see the light of the sky, he will also see the whole interior of the chimney and any obstruction in the same. As most chimneys are straight and perpendicular, reflection will make the top opening clearly visible.

To Make a Glass Checker Board.—Procure a pane of glass fifteen inches square, rub the edges with a piece of stone so that the fingers may not be cut, clean the glass, lay it flat on a table, mark a line one and one-half inches from the edge on each of the four sides; by that means you have a square inside of twelve inches, which, if divided into one and one-half inch squares, will give sixty-four squares, the number required for a chess board.

When the outside lines are drawn, draw eight lines from top to bottom; when dry, draw the eight cross lines. When the cross lines are finished, fill in the squares with paint. Black and bright yellow have a very good effect. Let the lines dry before filling in. Fill in the black first, working left to right; start in the left hand corner; when quite dry, fill in the yellow. Let the outside be a different color from the squares, say blue or any color to suit the fancy.

When the glass board is finished and put in a frame with a drawer beneath, it has a very neat and handsome appearance.

To Imitate Ivory.—Make isinglass and brandy into a paste, with powdered egg shells very finely ground. You may give it what color you please; but cast it warm into your mold, which you previously oil over. Leave the figure in the mold till dry, and you will find on taking it out, that it bears a very strong resemblance to ivory.

How to Thaw Out a Water Pipe.—Water pipes usually freeze up when exposed, for inside the walls, where they cannot be reached, they are or should be packed to prevent freezing. To thaw out a frozen pipe, bundle a newspaper into a torch, light it, and pass it along the pipe slowly. The ice will yield to this much quicker than to hot water or wrappings of hot cloths, as is the common practice.

Bean Poles.—Cut bean poles in winter, sharpen one end and bind them in bundles for garden use when wanted. A substitute may be made by setting a post at each end of the row, six feet high, and running a small line or wire directly over the row with perpendicular ones from each hill to the wire above.

How to Test a Thermometer.—The common thermometer in a japanned iron case is usually inaccurate. To test the thermometer, bring water into the condition of active boiling; warm the thermometer gradually in the steam and then plunge it into the water. If it indicate a fixed temperature of two hundred and twelve degrees, the instrument is a good one.

Economical Fire Kindler.—One may be made by dipping corn cobs in a mixture of melted resin and tar, and drying.

Tube for Poisoning Orchard Mice.—Bore a two inch hole into blocks of wood, and at the lower end of the hole put the poison made by mixing one part arsenic with five of corn meal. Lay these blocks about the orchard, and no animal but the mouse can reach the fatal bait, and it will work destruction among the pest.

To Layer Roses.—Use shoots of the young growth—that is growth of three or four weeks old, or such as are not so much ripened as to drop the leaves, or in other words, the cut should always be made at that part of the shoot where there are as green and healthy leaves below as above the cut. This condition of the shoot is very important, in order to produce a well rooted layer.

A slit cut like a tongue one inch long should be made in the branch which is put down. Some cut on the lower part of the branch, others on the top. Make a trench in the ground and bend the branch down into it, securely fastening it down with pegs on each side, then cover well with earth, leaving three or four inches of the end of the branch out of the ground. If the season is dry, watering will be necessary.

To Layer Shrubs Generally.—Any desirable shrubs can be layered the same way as roses, except that it is not so important to put down new fresh growth. If a branch is used which has a number of smaller ones growing off from it, and covered so as to leave the ends of each out, roots will be formed on each of the little branches. The tea olive roots beautifully in this way, but is difficult to grow from cuttings in the open ground. The oleander and rhododendron will also root finely by this last plan.

Layering carnations is often the only method of increasing some of the choice

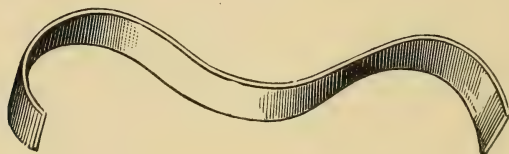
varieties. They must be put down in the same way as roses, the tongue being cut just below a joint.

Petroleum for Turning Tools.—It is said that if the point of the turning tool while in use be kept constantly moistened with petroleum, the work will proceed as readily as with hot metal. Steel, tempered to a light yellow, has been turned with the greatest facility by using a mixture of two parts of petroleum and one of oil of turpentine.

Test for Stone Lime.—The heavier the lime the more certain is it to be good ; but that rule is not in all cases to be relied upon. There are better indications : Good lime is greasy or salve to the touch, while poor lime is gritty and dry. When good lime slakes in water it falls quickly, causes the water to boil up furiously, and gives out a great quantity of heat. The slaking of poor lime is attended with but a slight boiling of the water, and a small increase of the heat ; moreover, the quantity of water required to slake good lime will be nearly one half its bulk.

Good lime, when slaked, will swell to twice its original bulk, and if exposed to water continually changed, the lime will all be taken up without leaving any residue. Poor lime when slaked, will swell to two and a half times its original bulk, and there will always remain a gritty residue, no matter how much water may be run over it.

To Draw a Curve.—Cut a strip of soft pewter, about one sixteenth of an inch thick, and a quarter of an inch wide, the length of the longest curve



PEWTER STRIP FOR TAKING CURVES.

required. Dress it straight, and smooth the edges with a file. By drawing the strip through the closed fingers of the left hand, or over the thumb, a very regular curve may be obtained, which can be altered at will till it matches the line to be drawn or copied. For fine or quick curves a lighter strip should be used.

To Make a Scrap Book.—Scrap books, as they are generally made, are rough, ungainly affairs, caused by the curling of the leaves of the book to which the scraps are attached. Mucilage, as generally purchased, will penetrate printing paper and give it a semi-transparent appearance ; so it should not be used. Use good flour paste, and only apply this to the edges and

corners of the scrap to be attached. By this method you will find no wrinkling, but have a flat, smooth scrap book.

Quick Way to Cast Interest.—Multiply the number of dollars by the number of days; strike off the right hand figure and divide by thirty-six. This will give one per cent., which must be multiplied by any desired rate of interest to be obtained. The rule is correct. A handy way to compute six per cent. is to reckon half a cent on each dollar for each month. For instance, fifty dollars for one month, twenty-five cents; seventy dollars one month, thirty-five cents. The cents equal the dollars in two months, and so on.

Shelter for Coal.—Experiments have proven that bituminous coal exposed to the weather suffers loss in weight as well as in gas making quality. From this it will be understood that coal should be kept dry and under cover; and that to expose it to rain or damp is to lessen its quantity and weaken its quality. Here, too, we have an explanation of the inferiority of the great heaps of small coal which encumber the ground in the mining districts.

Thawing Out Plants.—In case of frozen house plants the following treatment is said to restore them uninjured: Allow the plants to remain where they were frozen; darken the room as completely as practicable, and sprinkle them with water direct from the cistern. A few drops of spirits of camphor put into the water will render it all the better. Do not allow the room to become warmer than forty-seven degrees for twenty-four hours. Although the water may freeze in drops on the leaves when sprinkled, the plants will come out unharmed if this treatment be strictly adhered to.

Depth for Strength in Timber.—J. Scott Russell says: "The value of increasing the dimension in the direction of the greatest strain is mechanically expressed in the simple formula—that strength against a given strain is increased in proportion to the square of the depth; whereas, if it be given in the contrary direction, it is only strong in proportion to the simple breadth.

"As it is usual to call depth of a piece its direction of greatest strain, and width the direction at right angles to this, the formula is summed up in saying that the strength of a piece of timber is proportioned to its breadth simply, and to the square of its depth.

"Taking, then, a piece of timber twice as broad as another, it will be twice as strong; taking a piece of timber twice as deep as another, it will be four times as strong; so that the gain of increased depth over increased breadth is manifest. It must never be forgotten that to gain increased depth one way at the cost of diminished breadth the other way, is to weaken that piece against any strain to which it may happen to be exposed in the direction of its thinness."

To Manage a Wet Silk Hat.—When a silk hat gets wet do not attempt to wipe it dry, neither allow it to dry as it comes from the storm; either treatment will ruin it. When partly dry, wrap a dry towel around it to absorb

dampness, moving the towel a little with the lay of the silk. When nearly dry, rub with hot cloth until smooth, bright and glossy.

Drawings for Proposed Work.—By making a drawing of your work you get an exact representation of the effect of it when completed. The drawing should be made to some scale, say one inch or one and a half inch, to represent a foot of the actual work. If drawing paper and proper instruments are not within reach, use one of the planks or pieces of wood lying about your workshop, and mark out your scaled drawing with a carpenter's pencil or a piece of chalk.

From the scaled drawing you can mark out your wood to the proper size, and with its aid you can greatly economize material. Your work should be planned so as to allow the smallest possible waste.

To Pack a Trunk.—In packing a trunk, put the large and heavy articles, and such as will not be damaged by pressure, at the bottom. If the trunk is not full, take newspapers, spread them out to full width, then from the edges crush them together, forming elastic bunches. Put these in vacant space, and they will hold the articles below in place, and secure against damage.

A Water Telescope.—Take four pieces of half inch board, any length you desire. The length should be governed by the depth of the pond or lake it is to be used upon. Have two of the pieces five inches wide, and two, three inches wide. These, when nailed together, will form a tube four by five inches square. Before nailing together, one inch from one end of each piece, saw the boards half off. This will form a gain or kerf, into which is to be fitted a piece of window glass. Put together after coating all the joints with white lead paint. Put paint also in the glass grooves. You will have a very good submarine telescope. The tube glass-end is to be shoved down into the water, by use of sinkers. It is improved by covering the head with a shawl.

To Imitate Ground Glass.—A ready way of imitating ground glass is to dissolve Epsom salts in beer, and apply with a brush. As it dries it crystallizes.

Position for Seasoning Timber.—Timber will be seasoned better and quicker by being placed vertically, rather than horizontally. This will be evident when it is considered that the sap-channels run lengthwise of the timber, and that moisture evaporates upward.

To Paint Over Pine Knots.—If your work is to be painted, the parts marked by the oozing out of turpentine and all the knots must be covered with a composition called priming. Priming may be made of turpentine, linseed oil and red lead.

FOR THE BOYS.

An average boy takes to the use of mechanical tools about as naturally as a duck takes to water. The knife, then a hammer, hatchet and saw, are sought out and used as soon as he is big enough to handle them, and the more he is aided and indulged, the better pleased and the more useful he becomes. Mechanical tools are educators, for in them, or in the use of them, mathematical and philosophical problems are constantly arising and being overcome. Each mastery is a development of the reasoning faculties that will show itself most favorably in mature years.

As the child has first to creep and then walk, so the boy should begin his work with tools upon the most simple things that can be made for his enjoyment. If difficult work is begun first, discouragement may follow that will seriously blunt the natural gifts of the lad.

Men in all departments of our industries are sometimes placed where inconvenience, money and perhaps life might be saved, if the individual had even a moderate experience in mechanical affairs. Life may be endangered by a boat springing a leak, or by the breaking of harness or vehicle, with one man, while with another the danger would be obviated by the latter detecting and securing the weak points before disaster comes.

It will be noticed also, that one man will do double the work of another, to accomplish a certain end. The reason is, that the first has never had his natural mechanical tact developed. You can always feel assured when you hear a man say that he has no mechanical genius about him, that he can't make a chicken coop, that that man when a boy had neither facilities, time, or encouragement for practicing with tools. I never yet have met a boy who did not develop some skill as a workman who had access to good tools. If he never becomes a mechanic, even if he has no desire to be a mechanic, he has the leading principles of mechanical arts so impressed upon him, that their application will be found of value thousands of times during a natural life. Unconsciously these principles will come up, be applied, and the benefits derived when one makes no profession whatever to efficiency in the use of tools.

My effort in this department is to give to the boys simple rules and dimensions for making articles that the youth most commonly seeks to construct.

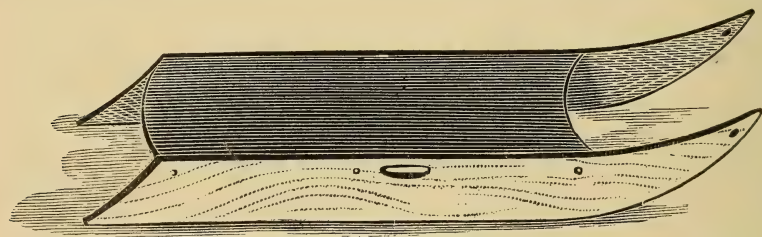
They are articles that I made in my boyhood, and such as any lad in the land may construct, and with the use of but very few tools.

One of the requisites to success is patience. Do not go to work in a hurry, and do not be discouraged if the desired result is not at once obtained. Go

slow, work with precision, and make everything you do look neat, or just as neat as you possibly can. Even in the sharpening of a pencil, learn to give a true sloping cut. Do not try to work with dull tools. Grindstones and whetstones are abundant, and in learning to sharpen tools, you are mastering one of the important branches of the mechanical field.

HOW TO MAKE HAND SLEDS.

Coasting Sled.—A coasting or board runner sled may be manufactured by any boy of ordinary mechanical genius. Take two boards three-quarters of an inch thick, twenty-eight inches long and four inches wide. Shape the ends as illustrated, then bore three holes in each runner with a three-quarter auger, and three-quarters of an inch below the upper edge. Bore first hole three inches from the rear top edge of runner, the other fifteen inches front of that,



BOARD RUNNER OR COASTING SLED.

and the third hole half way between the two. Next, just in front of the center beam hole, cut a place for the hand to grasp the sled when coasting. These hand holes should be about an inch below the upper edge, four inches long, an inch and a quarter wide in the center, and rounded on the edge so as not to hurt the hand when hard pressed. Bore with quarter inch bit a hole through each runner, near the front or point for the drawing rope to be attached. The runners are now ready for the beams. These should be of hard wood about one inch square. They should be cut twelve inches long and shouldered to fit the auger holes so that they are ten inches between the shoulders. When fitted, drive all three into one side first, then put on the other runner. Fasten by putting a screw down through from top edge of the runner.

When shouldering the beams leave the upper side with level surface, so that there may be three-quarters of an inch between the top of the beam and top edge of the runner for the seat board to go into. This board should be seventeen inches long, three-quarters of an inch thick, and just wide enough to set closely in between the runners. Shape ends as shown in the engraving and then screw down firmly to the beams. The sled will be found very substantial.

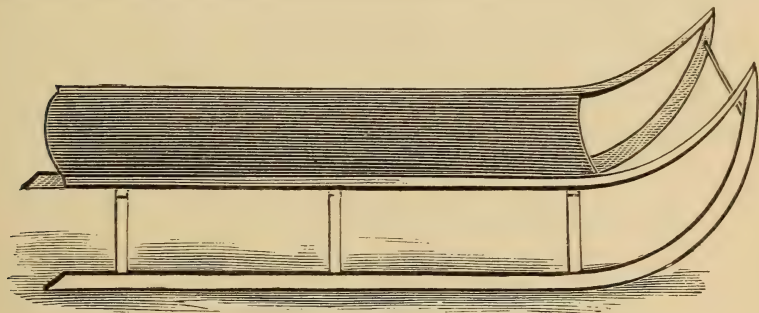
The proportions given for making a board runner sled may be varied to suit the manufacturer, but the size I have given is a popular one for boys. Where the coaster is made shorter, say twenty-two inches, but two beams will be required; thirty to thirty-six inch sleds are used by large boys.

To Shoe a Sled.—The durability may be a good deal increased by putting on iron shoes. To do this, get two pieces of three-quarter band iron, thirty inches long and one-eighth of an inch thick. Within half an inch of one end and two inches from the other, punch holes, then two more nine inches apart, which will divide all into equal distances.

To punch the holes, heat the spot in the stove until the iron is red hot, then use a piece of saw file ground round, rim out and countersink for screw head, with home made tools, if you have no others, as shown on page 16.

After thus preparing, bend the iron to conform to the curve of the runner, allowing the back end of the shoe, that with the hole two inches from the end, to turn up, so as not to catch when the sled is pushed backward. Fasten on with screws, three-quarters or an inch long, but see that the heads thereof set down even with the surface of the shoe or a little below. A stick handle should not be used for coasting; indeed they are but little used on any kind of hand sled now.

A Plain Framed Sled.—It is not as difficult a task to make a framed sled as most boys suppose. I will give dimensions and directions, making the operation as simple and plain as possible. Dress out two sticks twenty-eight inches long, one inch wide and three-quarters of an inch thick. They should be



A PLAIN FRAMED SLED.

of tough oak, hickory or ash. Make a form of right shape to please the eye, then proceed to steam and bend as directed on pages 30 and 31.

After the runners are bent, begin laying them out by boring three half inch holes through them from top to bottom; the first four inches from back end, the second, nine inches front of that, and the third nine inches from that. Next take six sticks three-quarters of an inch square, about eight inches long. Make round half inch tenons on each end, so that the shoulders are five and a half

inches apart. Drive one end of each into the holes in the runners, and you are ready for the beams.

The beams should be three-quarters of an inch thick, an inch and one-fourth wide, and fourteen inches long. One inch from each end bore a half inch hole, and the beams are ready to drive on. Before putting the sled together, bore two half inch holes a few inches from upper ends of runners and fit in a stick to draw by. When all is ready, drive on the beams and the draw stick, and then wedge the knees or posts of the sled. Put in the wedges so that they cross the length of runner and beam, which will prevent splitting.

Trim off the projections, top and bottom, and put on raves and shoes. The latter should be applied as directed for shoeing the coasting sled. Make the raves two inches in width and half an inch thick. They should be long enough to project two and a half inches back of rear beam, tapered and bent in front to reach the runner, as shown in the illustration.

The raves may be fastened by screws driven through into the beams, and one in front ends driven into the runner. If the shoe irons are long enough, it is well to have them come to the top of the runner, then bend over and take a screw in the rave. This will add very materially to the strength of the sled.

The seat board should be same thickness as the raves, shaped as illustrated, and screwed to the beams.

This sled may have iron braces if one chooses, but if well put together it will stand considerable strain without. Through the cross piece between the runners bore two holes an inch or so from the runners, in which to put the draw rope. The draw stick should be made three-quarters of an inch square, then chamfered to eight square. It should be of good, tough hickory, oak or ash. It is best to make the whole sled of tough timber; and be careful to have all the joints well fitted, for the firmness of the sled depends upon this.

Iron Braces for a Sled.—The iron braces for a hand sled need not be large; quarter inch rod is plenty heavy enough. Cut the rod into pieces five or six inches long. Heat to a whitish red at the ends, and flatten with a hammer on the head of an ax, then punch a hole through the flat part of each end. Prepare all the braces to be used in this way, then turn the sled bottom up and heat the irons again, but only to a dark red, and fit them in position by bending the end out of line.

Where rods cannot be obtained, large wire, such as is found in the tops of tin milk pans, may be used. Do not attempt to punch these, but cut to a length of six inches and then curl the ends to round circles by use of a pair of pincers and light hammer, then fit to place and put screws in through the curled ends. If the loops formed at the ends are not true with each other, they may be twisted by heating into any desired position.

Fancy Framed Sled.—Dress out two sticks of tough timber three-fourths by inch square and five feet long. Begin about two feet from one end

of each runner stick, and gradually taper to five-eighths of an inch square at ends. These tapered ends are for the front. Steam and bend after directions given on pages 30 and 31, making the circle as shown in the engraving.

For knees dress out six sticks of good timber about eight inches long, three-quarters of an inch thick, and tapered the other way so as to be three-quarters at one side, and an inch and a quarter at the other side. Thus the sticks are three-quarters of an inch square at one end, and inch and a quarter by three-quarters at the other end. The smaller end is to be framed into the runner, and the broad part into the beam, so as to give a bracing support there.

To frame the sled lay the knee sticks on as shown in the cut, and scribe with the point of a knife both upon runner and stick as guide lines for mortising and tenoning. Set the first stick six inches from rear end of runner inclined forward four inches, as shown in dotted lines of drawing. Set the



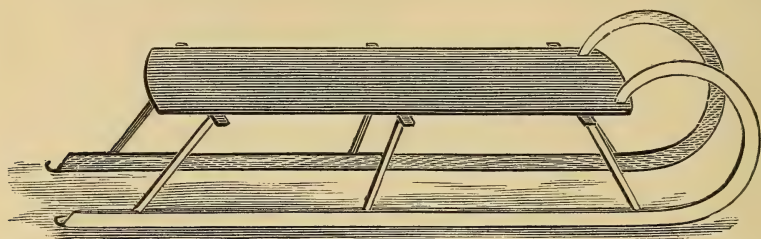
POSITION OF KNEES IN FRAMING SLED.

second twenty-three inches in front of that inclined backward one inch, then set the middle knee so that it divides the space between front and back, both at top and bottom, which will be an incline forward of about two inches. While scribing the knees for framing they may be held in place by little clamps made as described on page 20. Then proceed to mortise and tenon as directed on page 34.

The beams should be of good material, three-quarters of an inch by one inch, fourteen inches long. To frame these, set up the runners with knees in, so that the runners are thirteen inches and a half apart outside to outside, then incline the knees in until they are eleven and a half inches apart at top outside to outside. Fasten the beams on with clamps so that the knees will be six inches long between shoulders, and scribe for mortise and tenon as directed for the runners. This will leave the beams projecting an inch and a quarter, which is to be left with a tapering finish.

When measuring for the height of beam above runner, measure up the dotted lines, or, in other words, straight up from the runner, so each beam will be six inches high and all level. Do not attempt to frame on the beam so its sides will be perpendicular, for you will spoil the job. Frame on straight with the knees, and then dress off tops to get a level for platform.

Before putting the sled together, frame in a draw stick at the front of the runners in the circle, so that it will be a little above the level of the tops of the beams. This may be scribed and mortised in or fitted to a round hole.



A FANCY FRAMED SLED.

It should be about ten and a half inches from shoulder to shoulder; this, however, is adjusted to the runners after they are framed into position. Two holes should be bored in the draw stick one inch from each shoulder, for the rope.

No raves are used upon this sled. A bed board eleven and a half inches wide, twenty-five inches long, and half an inch thick is used, and shaped as shown in the illustration. Fasten it securely by screwing it down to the beams, then through half inch holes force the ends of the runners after they are fitted, and secure them by screws on under side. The small ends of the runners should be about nine inches apart, inside to inside.

Painting Hand Sleds.—As soon as the sled is completed give it a priming coat of paint, and when that is dry, follow with coatings more substantial. If the joints are well fitted up and pinned with draw boring, but little putty will be needed. [See how to draw bore, page 35.] Red is a pretty color for a hand sled, either red lead or vermilion. The latter is richer in color, but not so durable. A Paris green is also very pretty. Do not use a dark color; it had better be white than black, or pink than brown.

HOUSES AND COOPS FOR BIRDS.

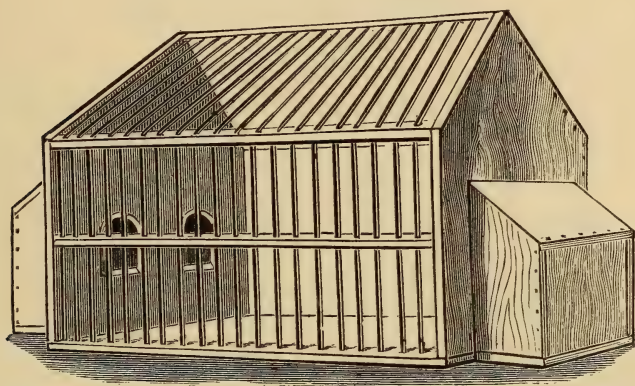
The Pigeon House.—A very good size for a pigeon house is three feet long, two feet wide, and twenty inches high to the spring of the roof, and nine inches pitch; that is, twenty-nine inches in all from the base to the highest point.

How to Make the Cage.—Get for each end three boards eight inches wide and one inch thick, nail them to two cross-pieces one inch thick by two inches wide, or two boards, twelve inches wide, may be used.

The floor should be made of three-fourth inch stuff, placed the short way; that is, from the front to the back of the coop. The sides or front bars should be made of three pieces an inch square, and the piece at the top or angle one inch by an inch and a half, either nailed in between the heads or ends, or what is better, notched or lapped, or dovetailed into the heads.

The back of the coop can be like the front, or it can be made close with boards. Small sticks may be used for upright bars, or galvanized wires may be employed. The spaces between them should be about an inch and a quarter each.

To Make the Nest Boxes.—Two nest boxes, one on each end, should be made eighteen inches long and nine inches wide, and about sixteen inches



HOME MADE PIGEON HOUSE

high, with a shanty roof or top, to be made of half inch stuff, and nailed as shown in the engraving. Two holes should be made in each end of the cage to give entrance to the nest boxes. To make these holes, first mark out in each end two half circles with compass, for the tops of the openings, then bore a hole in each with a bit, then use a keyhole saw to cut out the pigeon door. If you have no key saw, bore a series of bit holes connecting, around the half circle, then saw up from bottom with common saw, and smooth out with a jack knife.

The Martin Box.—The best material for a martin box is pine lumber, three-quarters of an inch thick. One board, nine or ten inches wide and twelve feet long, is sufficient for the whole. No definite dimensions will be given, as boxes may be made of any size one chooses, but there are certain proportions that should govern the construction. The length should be about one-third more than the width. If the box is to be nine inches wide, make it twelve or thirteen inches long.

The height should be in proportion to whatever length is used—indeed, should be about three fourths the length.

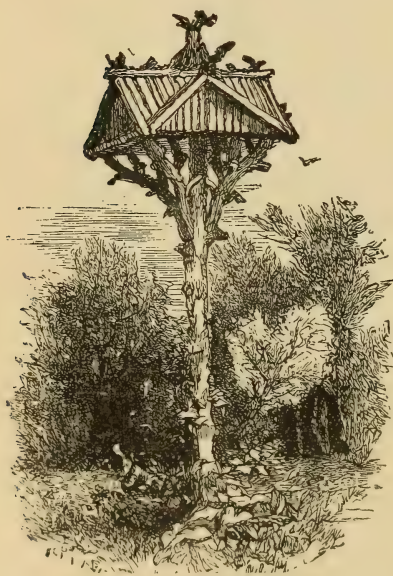
How to Make the Box.—First dress out the bottom board, say nine by twelve; cut two side boards same length, and about eight inches wide, and nail them on. Cut two end boards as wide as bottom and sides, thirteen inches long, and from upper edge of sides, bevel to a point in center for roof; then cut bird hole in one end piece and nail on both pieces. Now, with the plane, bevel off edges of side board to correspond with roof, and put on the roof boards wide enough to project below to form eaves, and an inch at the ends to give appearance of a cornice. An inch and a half projection will not look bad. Read hints on construction of dog kennel.

If the bird box is to represent a house with side entrance, the end boards should be made same width as the bottom, and the sides made long enough to cover ends.

Nail two sticks, one by two inches—flat sides to the two end boards on inside to represent chimneys. Cut notches in roof boards to go around them, and leave good projections of roof at ends. Two doors should be cut in the side and none in the end, but a window can be painted there. Some make a bottom board wide and nail it on with projections, but there is no use of this, as the birds do not need it for a lighting place, besides it is unlike a human residence, which it is calculated to represent, and it gives lodgment to snow and rain, which works decay.

Inside Construction.—On the inside, before nailing on last side or end, fix a little box, no matter how rough or rude, for the bird to build her nest in, but do not attempt to supply the bird with material to build with. She will prefer to select her own, and you only make her the trouble of carrying out the litter.

Color of Martin Box.—Stone gray, white and brown, are good colors for painting bird boxes. Something depends upon the position they are to occupy.



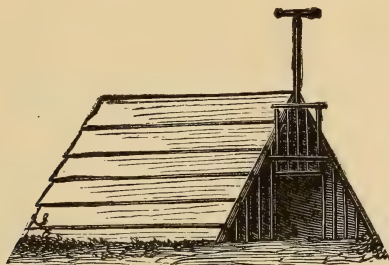
RUSTIC BIRD HOUSE FOR SHRUBBERY.

Rustic Bird House.—A rustic bird house may be easily constructed. It may be formed by tacking split sticks upon a board house, or made entirely of round limbs and roots.

The Gothic style represented in the engraving is very pretty. It should be erected upon a pole containing the bark and stubs of limbs. Set the pole,

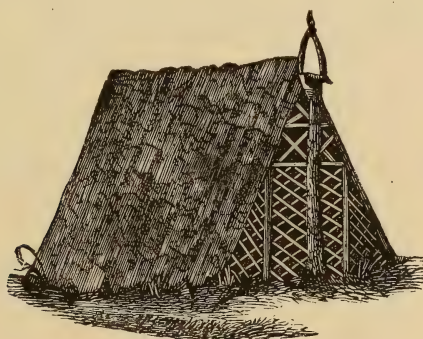
if possible, amid a clump of bushes. It looks much better than when standing in open space.

Coop for Fancy Birds.—Boys not unfrequently have some pet chickens or fancy birds, for which they wish to prepare rather handsome quarters.



COOP FOR FANCY BIRDS.

This may be done and at no great outlay. Prepare an end piece, say two feet wide at the bottom and two feet high, terminating at a point in the center. For the front use two pieces of board, one by two inches, mitered together at top and stayed at bottom by cross stick. These three pieces should form a triangle of exactly the same size and shape as the outer surface of the rear board. Place the two ends three feet apart, and put on the sides, which should be of clap-boards three and a half feet long. After both sides have been covered, strike a line down the ends of the siding and saw off square, leaving as much projection over the end pieces as possible, at least two inches at each end. When nailing on the boards, hold an ax under the frame sticks to prevent their jarring out of place.



RUSTIC COOP FOR FANCY BIRDS.

To finish the front dress out some half inch sticks two feet or less long, one and a quarter inches wide, and put these on up and down with space of an inch and a half between them. Leave an open space ten inches wide in the center,

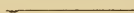
and to this fit a slat door made of same material, to work between two cleats, as shown in the illustration. The center sticks should be three inches longer than the heights of the coop and a cross piece screwed to it, to work the trap door by. It will be found very handy, and if tastefully constructed somewhat ornamental.

The Rustic Coop.—Where the fancy is to be indulged, a boy can surprise himself at the results of an effort at rustic work. In the first place he does not have to meet the very difficult operation of squaring of timber and making hair joints. The framework of the rustic coop may be after the manner of "Coop for Fancy Birds," both ends made of triangular pieces and ribs put on instead of boards, and then the rustic strips put up and down, fitted as closely as possible. The front can be made to suit the fancy. Cross slatting, as shown in the illustration, has a nice effect.

If a saw mill can be reached, thin slabs with the bark on make excellent material for covering a rustic coop. By dressing off the edges with a draw shave and planing them a little, very good joints may be secured.



THE RABBIT CAGE.



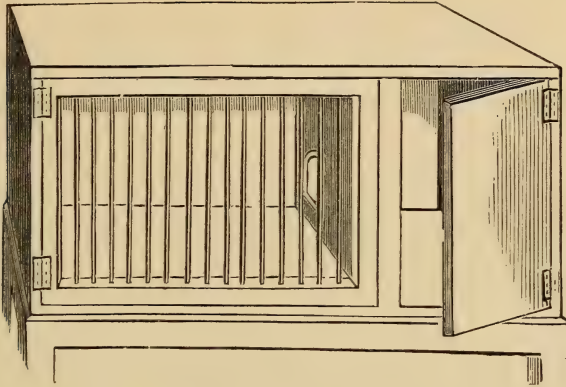
Size of Cage.—Almost every boy of a dozen years of age has tried to make a cage for a rabbit, and a few suggestions will, perhaps, be of aid. The following dimensions, which are very good, are from *Carpentry and Joinery*. A good size is three feet long eighteen inches wide and fifteen inches high. There should be a partition, so as to provide a bedplace one foot from the right hand end, with a hole cut for the animal to enter from the outer house.

Construction of Rabbit Cage.—The bottom should be made of three-fourth inch board, the two sides three-quarters of an inch, the back half an inch, and the partition half an inch. Saw these into their proper lengths with a hand-saw. A rabbit-cage is not necessarily a finished piece of joinery; it is not therefore usual to plane up the boards before fitting them.

The frame should be nailed together with one-half inch cut nails. The large door should be made of one inch stuff, one and a half inches wide, halved or lapped at the corners. The top and bottom bars should be set out with the compasses one and a half inches apart for the upright bars, which should be of stout galvanized iron wire. When set out, holes should be bored with a gimlet to receive the iron about half an inch deep.

After nailing the frame of the door together it should be hung on hinges or "cast butts," as shown in the drawing. Next comes the upright divisional bar,

which should be two inches wide, and let into the top and bottom of the cage frame. The small door is a plain board three-quarters of an inch thick, hung on hinges similar to the large door, and opening in the opposite direction.



HOME MADE CAGE FOR RABBITS.

BOAT MAKING.

The Raft.—Flowing streams, placid lakes and ponds possess a special charm for boys. They love not only to get into the limpid water, but by some device to float upon it. An ax and auger are all the tools necessary to make a raft, and in an emergency the ax alone will answer. Two logs, ten feet long, more or less, pointed at front ends, and held four feet apart by pieces of scantling or saplings pinned upon them, make the foundation. In the absence of an auger, the cross pieces may be lashed on with strips of basswood bark.

On top of the cross pieces a floor may be made of old boards, or of poles laid close together. This cheap and quickly constructed raft is capable of floating thousands of miles, and bearing considerable burden. By setting up some crotched sticks in the logs for oar-locks, the raft may be rowed quite rapidly, or forced along by the shoulder pole, after the manner of the Mississippi raftsmen.

The Flat Boat.—The flat boat or scow, is one of the cheapest devices, made from lumber, that floats. Any boy of common genius can make one, and with but very few tools. All the lumber necessary is two one and one-fourth inch planks, ten feet long and about as many inches wide; two pieces of same thickness, four inches wide, three feet long, and a few inch pine boards.

The two long planks are for the sides, and the four inch strips for ends. Upon one edge of the two long planks, measure from ends twenty-six inches,

and draw a line from that point to the end and to within four inches of the opposite edge, then saw off the pieces. This will give shape to the bottom of the boat. After both ends of the two side planks have been cut, put in the end pieces and nail them firmly. Then dress off top and bottom with a jack plane.

Cut the pine boards into pieces an inch longer than is necessary to reach across the boat, and begin at one end to nail them on, fitting up close joints as you go. A very good way is to have some strips of cotton cloth dipped in hot pitch, and put these between the edges of the boards, crowding up as firmly as possible.

After the bottom has been covered, dress off the ends smooth, then saw off the projections at the sides, and smooth down with a plane. A boat of this kind, though roughly made, will not leak after once becoming water soaked. In case there is leakage from bad joints, crowd in a little tow or hemp, procured by scraping the end of a rope, and coat the material thoroughly with hot pitch or coal tar.

Through the center of the scow lengthwise, put a three-quarter stay board, one foot wide. This had better be screwed down, as nails will be likely to punch out pieces at the bottom. Seats twelve or fourteen inches wide can be nailed across each end, and one for the oarsman, front of the center, and below the top a few inches, resting upon cleats. If staples are used upon the oars, holes in the tops of the sides may be bored of proper size to take the irons loosely. If oar-locks are to be used, upright pieces of boards, with hollowed ends, may be screwed to the inside of the planks, at the proper points. The boat is all the better for being painted, if one has the material to do it with. To prevent decay, it is well, at least, to coat the edges of the side planks with white lead paint before nailing the bottom on, and also to sink the nail heads, and paint and putty the holes.

The Row-boat.—A nice, light row-boat is not very easily constructed, and yet there are not a few young, mechanical boys, who can make one by following the simple directions here given. Take for sides, two clear pine boards three-quarters of an inch thick, twelve feet long and about a foot wide. A little wider will do no harm. Cut these boards so they will measure twelve feet on one edge in length, and eleven feet and four inches on the other edges, the bevel at the ends being exactly alike. Now cut a board forty-two inches long, on one edge, and thirty-four inches on the other, one foot wide bevels alike at each end. Cut the third board, which should be an inch and a quarter thick, and one foot wide, so that it will measure eighteen inches on one edge, and a foot on the bottom.

Now you are ready to begin to put the boat together. The plank is for the stern end of the boat, the forty-two inch board simply for temporary purposes, to make the swell of the body. Put the stern plank in and hold it in place by screws put through the side pieces; then put in the center board and bring the

front ends together, and have some one hold them while the corners are beveled with a chisel, so as to make a good joint. Between the ends it is best to put a piece of plank with one-half of sides cut away, so as to form a projection in front and shoulders for the extreme ends of the boards to set against. This, however, is not absolutely necessary. The boards may come together and be firmly screwed in place from both sides, and then a corner piece fitted on inside, and another row of screws driven through the sides into this.

Now finish fastening the stern end board and then turn the boat over. It will be found quite rounding from end to end on the bottom. Use a plane to flatten the center into proper shape for resting upon the water, and dress the edges all around so that the bottom boards will fit snugly. Put on the bottom as directed for flat boat. Do not nail the bottom to center board, for that is to come out. After the bottom is finished, turn the boat right side up for completion.

On the sides at the stern, screw two cleats three inches from top, and fit in a seat. Do the same at the front, and put another in the center for the oarsman. Before putting in these seats, however, put in the long stay board as directed in construction of flat boat. The oar-locks can be put in as before directed. If the boat is to be painted, use white lead and linseed oil. It is most durable, and has the best appearance.

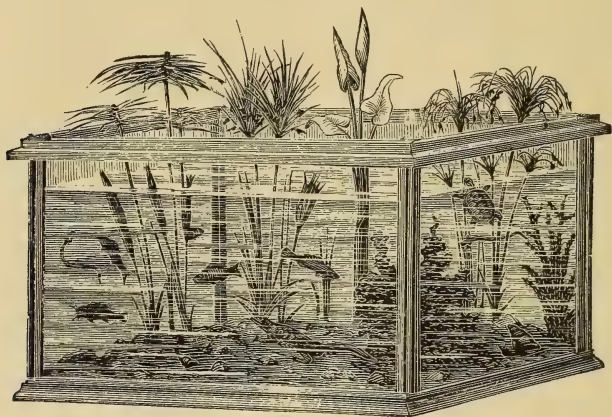
THE AQUARIUM.

How to Make an Aquarium.—Under ordinary circumstances it is cheaper to purchase an aquarium than to make one, but there is something of a satisfaction in having an article of that order of home manufacture, even if it is rude in construction. One can be made in proportions so as to be adapted to any desirable location. A very symmetrical size is about twelve by twenty inches, with depth the same as the width—one foot. Where it is not convenient to get glass for the size mentioned, it may be made to the common window-light sizes.

If one is not an experienced carpenter, the better way will be to have the bottom board to begin with two or three inches longer and wider than will be necessary when completed. Take four sticks about an inch square and a foot or more long, and on each of two sides cut grooves either with a hand saw or narrow chisel about a quarter of an inch deep, and wide enough to admit the glass easily. When the posts are prepared set them up, fit in the glasses by the aid of some person, and then place the frame on to the bottom board, and when in exactly the right position, mark around the base of the posts with a pencil, and then remove the frame, and you have the points for boring the post holes. Of

course, these holes should be smaller than the posts, and the latter cut down with a square shoulder, and the tenons fitted snugly. Cover the tenons with white lead paint before they are driven in and wedge them at the under side, cross ways of the grain of the bottom board, so as not to split the latter.

The glass may be set in white lead paint. Cap or margin pieces may be



THE AQUARIUM FILLED.

halved together, and held down upon the edges of the glass firmly by a screw at each corner driven down through cap pieces into the top of post, which should be cut off square and even with top edge of glass.

Fitting Up the Aquarium.—Now the aquarium is complete save cementing. For material to do this with, see "Aquarium Cement." Coat the bottom with waterproof cement, put in an inch of clean gravel or pretty stones, and build up a little rockery, with arch for fish to dart through. Aquatic plants and lycopodium moss are pleasing additions.

THE HOME GYMNASIUM.

Importance of Gymnastics.—As health, strength and longevity are very much dependent upon physical culture, it is important that every boy have means of developing his muscles. Those who are working hard at the bench or upon the farm have sufficient opportunity for the outlay of strength, and the important rules for such to adhere to are keeping the form erect, the head up, the shoulders well back, and the chest thrown out.

Care in standing or sitting will very soon form a correct habit, and that

which is considered something of a tax at first will soon become an easy and agreeable position. There is no excuse for a person being round shouldered, narrow, hollow chested and cramped up as if a heavy weight were resting on the head.

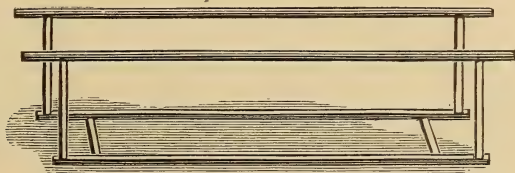
The Horizontal Bar.—For expanding the chest the horizontal bar is one of the most efficient means.

It may be constructed in the house, barn or woodshed, by simply attaching a rope to some point over head, and to the lower end fastening a round stick like a hoe handle. The rope should be fastened so that it will not slip at the balancing center, and the stick suspended not more than eight inches above the head. If preferred, there may be two ropes used, one at each end of the bar, same as the elevated trapeze. Hazardous exercises upon the trapeze are very different from those calculated for health and development, and should not be indulged in unless one is training for public exhibition.



HOME MADE DUMB BELLS.

Dumb Bells.—No articles in the outfit of the gymnasium are better calculated to develop the whole muscular system than dumb bells. If the iron ones cannot be handily purchased, bells may be made at home that will answer very well. Take four blocks of wood about five inches square, round edges and corners and then connect them by round hand pieces, so that they will be about six inches apart. A set of dumb bells for a boy should not weigh all together more than five to six pounds, that is two or three pounds each, and one and a half pounds will be found heavy enough to begin with. They may be weighted by boring a large hole in the head end, and pouring in lead. Exercises with these develop the muscles of the arms, chest, back, hips and legs. The motions should be steady up and down, front, back, etc., standing in an easy position. A book giving full instructions can be purchased for ten cents, through any book or news dealer.



HOME MADE PARALLEL BARS.

Parallel Bars.—These are made by four upright posts and two parallel cross bars. The bars should be about six feet long, some twenty inches apart, and about the height of the hips. Standing between the bars, the hands

are placed upon them, and the body lifted and held suspended while it is swinging back and forth. The exercise gives strength to the wrists and arms.

The Striking Bag.—Take a stout sack about half the size of a common grain bag, and fill it with curled hair, wool, rowen, cotton or even bran, and suspend it by a rope with its center breast high, and you have a good striking bag for development of the muscles of the chest and shoulders. Stand at arms' length and punch the bag with straight shoulder thrusts. Before filling the bag, put a rope down through it and out of the center of the bottom; have a bit of board there with a hole in it for the rope to pass and be knotted. After filling, tie top of bag around the rope.

To Make Stilts.—Walking upon stilts gives special action to the muscles of the body. The effort to balance is a beneficial exercise. In making stilts, do not have them high at first, that is, do not have the foot rest far above the ground end of the rod. One foot is sufficient to start with.

To make the stilts, saw out two hard wood sticks six feet long and an inch and a quarter wide, and lightly chamfer the edges. Dress out a foot piece as shown in the engraving, and fasten to the pole one foot from the end by two large screws. Pass one screw through the small end of the foot rest, the other through the pole into the top of the foot rest. When walking, have the poles back of the arms pressed firmly against the shoulders, and the hands grasping the poles at a convenient distance down.

The stilts here represented are the only kind that should be used. They can be quickly changed as the performer becomes accustomed to them, by removing the screws, setting the foot pieces higher and screwing on again. Sometimes boys cut staddles in the woods with a limb or crotch at convenient distance for a foot rest, but as a general thing they are not fit to use, for they cramp the foot, wear the clothes and are not adjustable, beside, if light, are liable to split down.

The short stilts should not be used, for they are dangerous affairs. They are made extending only to the knee and lashed to leg and foot. If one loses his balance with a set of these, disaster may follow. With the stilts illustrated, having no stirrup or foot binder, a boy can easily drop to his feet unharmed, in case of a misstep or lost balance.

The Health Lift.—Get two pulleys, and about eight feet of rope, size of a drum cord. Attach the pulleys to the side of the room about the height of the shoulders and about two feet apart. Cut the rope into halves and attach a weight to one end, and a hand piece to the other, the ropes passing through the pulleys. By placing the back toward the wall, a healthy exercise is obtained by grasping the handles and pushing the arms straight out from the

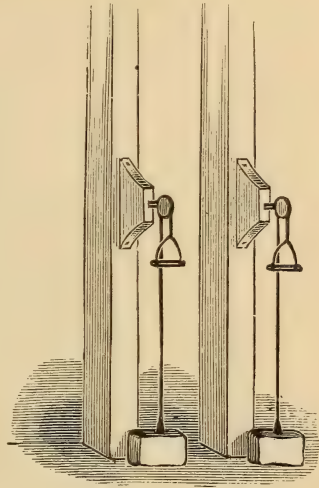


WALKING
STILTS.

shoulders, lifting the weights attached at lower ends of the cords. This apparatus can be best arranged in a room that is only studded, as free play can then be given the weights. Projections may be put on the wall or the ropes pass through a partition and the weights placed on the other side.

To make the hand pieces, bore holes through two round sticks six inches long, near their ends, and after binding the cord about eight inches from its end, divide it, and put each half strand through the holes in stitch tie knots, to keep them from slipping out; thus you have a band piece like the stirrup of a saddle. The weights should not be heavy at first; so light, indeed, that they may be lifted with little effort, and then added to, as the exercises are continued. Over-exertion is a damage, instead of a benefit to any one.

By use of a double set of pulleys, and having the hand pieces come down from above, the arms may be exercised by downward pressure. The hand pieces should hang about six inches above the hips at first, and be shortened to hang at the breast after having become accustomed to their use. The apparatus can be easily constructed in a wood shed, barn or house room, that has not been plastered, without damage to walls,



HOME MADE HEALTH LIFT.

BALLOON MAKING.

To Make a Paper Balloon.—Procure a few sheets of tissue paper; different colors if you can; paste them together so that the sheets will be three feet long, then cut eight strips shaped like the drawing, ten inches wide at widest place, which should be about fifteen inches from top, five inches wide at the bottom, and finish at a point at top.

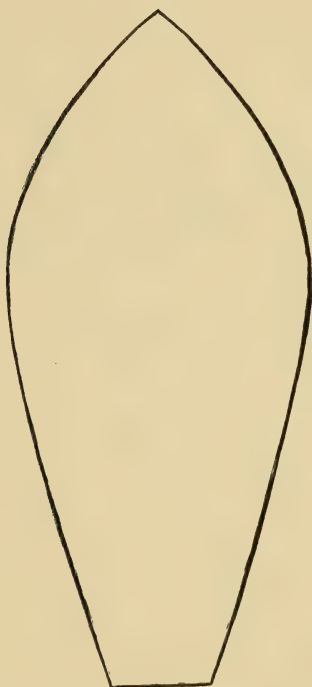
Now paste the edges of all these together, and you have the greatest part of the work of construction done. If the points at the upper end do not come together so as to make the sack air tight, cut a piece of tissue paper on a circle as large as a tea saucer, and paste that on top over the junction of the points.

The balloon will be open at the bottom a foot or more, and around this

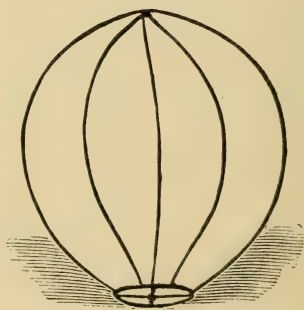
margin put a light stick hoop. A small willow stick peeled, bent and dried will answer, but it must be very light. To fasten, simply paste the edges of the strips around it.

Now cross two wires over the mouth and fasten. These are to support the fire ball. The wires should not be larger than linen thread, for it must be borne in mind that everything must be light. The balloon is now finished.

How to Send Up a Balloon.—Make a pretty firm ball of cotton, about the size of an English walnut, and put the fine wire around it twice, leaving the ends stick out an inch to fasten to the cross wire supports with.



PATTERN FOR BALLOON.



PAPER BALLOON INFLATED.

When ready to send up the balloon, dip the cotton ball in common kerosene lamp oil or alcohol, place it upon the cross wires in center of opening, and holding a fruit can with both ends off, or a strip of tin bent in a circle over the cotton, touch a lighted match to it, and have a second party hold the balloon upright.

As soon as it becomes inflated with hot air, take off the tin chimney and let it go. Never attempt to send up a balloon on a windy day.

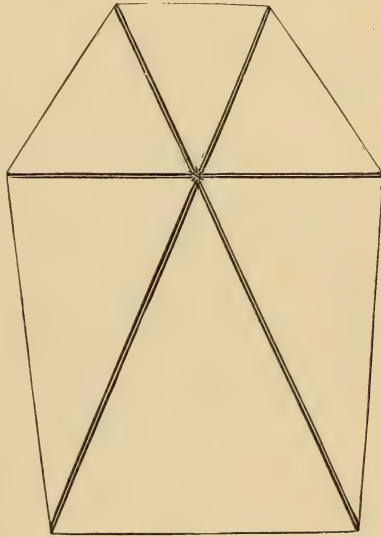
Newspaper Balloon.—If newspaper is used for a balloon, it must be larger than dimensions given here, as it will be too heavy for the volume of hot air. I have given a very good size, and it is from a pattern of my own.

KITE MAKING.

To Make a Three Stick Kite Frame.—In their first attempt at kite making, boys are usually disappointed in the working of their productions, and for their benefit I copy the practical directions given upon this subject by S. H. Peabody, A. M. "Among the various kinds, the 'three stick' kite is probably the surest for the beginner. Get three light, thin, straight sticks of cedar, pine or similar wood; smooth them, and let them be about half an inch wide by an eighth thick; perhaps a little more.

"Make two of them thirty inches long and the third twenty inches. Mark a point ten inches from the end of each of the long sticks, and in the middle of the short one; cross the three sticks at these points and tie them firmly with twine.

"Cut notches lengthwise across the ends of the sticks, and tie a stout twine from end to end, making the outline of an irregular six-sided figure, of which the bottom may be sixteen inches long; the sides about eighteen and a half; the shoulder eleven, and the top eight inches. These numbers may vary; it is necessary only that the corresponding sides should be exactly alike, or the kite will not be well balanced. This finishes the frame."



FRAME FOR STICK KITE.

To Put on Kite Paper.—Lay down a sheet of strong, light paper, lay the frame upon it, and cut the paper about two inches larger than the frame, all around. Fold the outside over the strings, and paste down with good boiled flour paste, cutting out the corners where they lap over.

How to Hang a Three Stick Kite.—The next thing is to hang the kite. Measure from each lower corner five inches along the sticks; make a small hole on each side of the stick through the paper, and tie in the ends of a

string, which should measure, when tied, about fourteen inches from stick to stick. This is the lower loop. In like manner tie an upper loop, about eight inches long, to points about three inches from the upper end of the same stick.

Remember to have the loops on the face side of the kite; that is, the side on which the sticks are not seen. Join the middle of the two loops by a string twenty inches long; this is the belly-band. Hang the kite by the belly-band over your finger, and hold it so that when one end of the kite touches the floor, the other may be about a foot above; there is the place to tie the line, making it fast so that it will not slip.

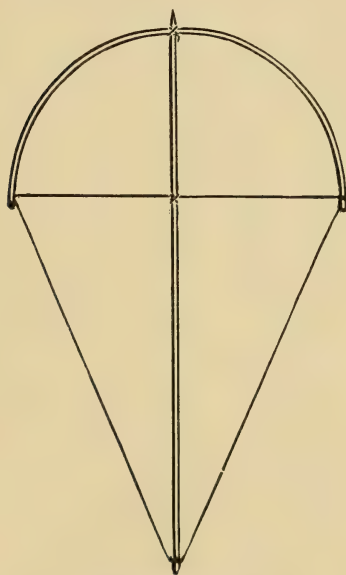
When the kite floats in the air it should lie at an angle of about forty-five degrees; if it stands too straight the string is fastened too low on the belly-band; if too flat, the string is not low enough.

To Make a Bow Kite.—All the material required is simply a bow, a stick and string. The bow should be three-fourths as long as the upright rod. If the length of the straight stick is forty inches, the bow should be thirty inches long. When the bow is on, a string should be tied across, bringing

the ends up until twenty inches apart, and the string across the center stick ten inches from the top, or about that distance.

The bow is fastened to the center rod, about an inch below the end. It may be notched in a little, and then should be firmly bound. Give the cross string a wind once around the center stick, so it will not work back and forth. The next operation is to tie a string to one end of the bow, pass it around into a groove cut near the lower end, and tie it firmly. Then carry it up to the other end of the bow. This completes the frame, as shown in the engraving.

Both of the sticks to be used should be light. They may be of tough wood, but if so, made small. The bow may be made from a willow stick divested of bark, or from a piece of barrel hoop. A black



FRAME OF BOW KITE.

ash hoop from a flour or fruit barrel will provide good material. As the hoops made from that timber are split, they are straight grained and may be whittled down to the desired size. When dressing out, find the exact center by measure, and whittle so that the bow will exactly balance when supported at center upon the edge of a knife. Put on paper as described for stick kite,

To Hang the Bow Kite.—Measure from top downward one-fourth the length of the center stick, and up from the bottom same distance, and make holes through the paper at these points, and tie in the two ends of a string long enough to make a slack. The kite string is to be fastened to this belly band, but should be attached with a slip knot so that it may adjust itself when the kite is pulling upward, and fasten it there. Put on sufficient tail to make a good balance and have plenty of cord for flying the kite with.

How to Make a Kite Tail.—The kite must have a tail to balance it. If the tail is too heavy the kite will not raise it; if too light, as is usually the case, the kite will not stand steadily, but will drive from side to side. Whenever it does that, it should be taken in and more weight added to the tail.

Cut pieces of writing paper, four inches wide and six or eight inches long; fold back and forth, fan-like, and tie three inches apart, on a string until you have three or four yards. Then cut a quantity of strips, half an inch wide and twelve or fourteen inches long; tie the bunch of them by the middle, fold the ends together and tie again, making a tassel, which you may tie to the end of the tail. If the strips are of colored tissue paper all the gayer.

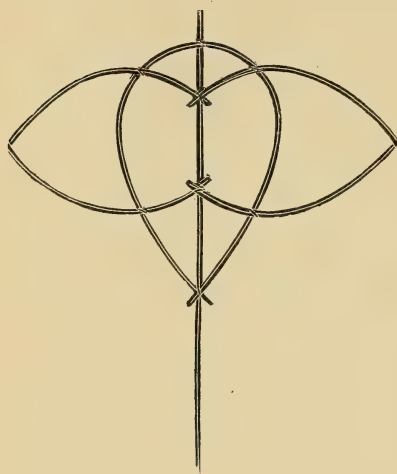
Tie a string about twenty inches long to the two lower corners of the kite, and fasten the tail to the middle of it. Choose a smooth, close, well-spun string, linen is the best—and costs most—not too large, or its weight will make it “sag,” or too small, or the kite will fly away with it. Finally, don’t try to fly a kite when the wind don’t blow.

Things to be Observed.—“The important items are: The kite must be truly made, so that one side may just balance the other; it must hang at the proper angle to the wind, and the tail must be rightly proportioned in weight to the size of the kite. If the kite don’t behave well at first, think which of these items have not been carefully attended to, and correct. Don’t give up at the first trial.”

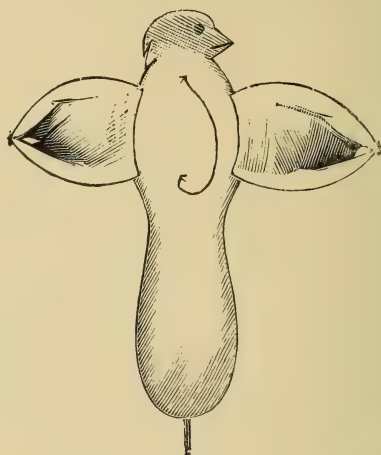
The Bird Kite.—In China the kites are made in the form of different species of birds, reptiles, beasts, etc., and are sent up without the long pendant, or tail, as in this country. They fly nicely and can be easily made by any boy, if directions are followed.

Frame of the Bird Kite.—Take some small sticks of rattan not more than an eighth of an inch square, bend and tie after the manner of the illustration No. 1. The center stick make fifteen inches long; the center bow eighteen inches long. Bend so as to spread four and a half inches wide at widest part. The side bows are made of two sticks each, ten and a half inches long, bend and tie as illustrated so that in widest part there is a space of four and a half inches, and where they join the upright stick, one and a half inches apart. The top of the center bow should come two inches from the top of the upright stick. Tie the sticks together with linen thread. The frame is now ready to put on the cover, which should be of rather stiff paper,

To Cover the Bird Kite.—Fancy paper should be used for covering if possible. Red is the most attractive, but red and white will give a very good showing; either the body part white and the wings red, or *vice versa*, or it may be all red or all white. Cut out the body part fourteen inches long. This will allow the stick to project at the bottom one inch. Cut the body a little wider



NO. 1.
BIRD KITE FRAME.



NO. 2.
BIRD KITE COMPLETE.

than center hoop, so as to paste on, and the tail part of the bird four inches wide pasted only to the center stick, the sides left self supporting. The paper should be stiff enough not to double in a breeze.

The wings are cut so as to be pasted to the center hoop and conform to the wing bows at the base, but the outer end is cut four and a half inches wide and left square at the outer edge. Double the outer edge in center and bring up to the bows and trim so as to conform to shape. This will make a sack at the outer ends of the wings, which will support the kite when struck by a breeze. Do not paste the folded outer end, excepting at corners where it comes to the bow. The opening will give escape for the air so as not to break the string or burst the kite in a lively breeze.

To Hang the Bird Kite.—Take a linen thread, ten inches long, and on the paper side punch holes and tie one end of the string to the crossings of the center stick and center bow, which is two inches from top. Four and a half inches lower, tie the other end of the string to center stick, and this forms the belly-band to attach the flying string to, which should be put on same as in bow kite. The top end may be cut like a bird's head and ornamented to please the taste, but should be kept light. The string should be very light also.

WIND WHEELS.

To Make a Wood Wind Wheel.—One of the first mechanical efforts of a boy is the construction of what he calls a wind mill. There are likely to be several failures and perhaps a discouragement, because he cannot get one to go as desired. The trouble generally arises from cutting the wrong corners when thinning down the flanges.

To make one properly, take two pine sticks one inch square and ten inches long; halve these together in the crosswise, and holding it up in front of you, mark the corners to work off. Hold it so that one stick is upright, then mark the left hand corner of top half and the right hand corner of lower half. Then turn it a quarter of the way around so that the other stick is upright, then mark that the same way and take the cross pieces apart and chamfer down according to the marks and you may be sure that the wheel will whirl, if properly hung.

The stick to which this wheel is attached must be cut fan shaped or more like a butter paddle, so as to act as a weather vane and present the wheel to the wind. Make the end of the stick, against which the wheel runs, a little rounding, and as an axletree, file a nail perfectly round or use a wire with the end turned at right angle. A tin washer should be put upon the front to prevent the wire end or nail head wearing into the wood.

After the wheel is put on, get the balancing point and then bore a gimlet hole for the working of the vane. Drive a piece of wire into the top of a center post which should be rounded a little at the end, and drop on the shaft, and the thing is complete. If it is desired to attach power to the wind wheel, the axletree must turn with the wheel and have a crank formed at the end.

How to Make a Pin Wheel.—A paper pin wheel affords no little amusement to children. A stick six inches long the size of a lead pencil, a pin and sheet of letter or calendered paper is all required to make one. Cut the paper square, six inches less or more, fold down one way with corners even, then fold down again so that two fold lines cross in the center. Straighten out, then cut from the four corners toward the center until within half an inch of that point. Now bend over in a circle each right hand half of the split corners, to the center, and put a pin through the four pieces and the main piece into the end of the stick. A slight motion forward will make it whirl briskly.

Use of the Wind Wheel.—The wheel, especially in the rural districts, is of considerable value, as it not only makes a good weather vane, but very clearly indicates the strength of the wind. I very well remember how my father every morning consulted a wind wheel I had constructed, to determine whether or not it was to be a good day for the performance of contemplated work upon the farm.

HOW TO MANAGE A WATCH.

Improper Handling of a Watch.—The first watch that a young man or boy possesses usually requires more repairing than any half dozen subsequent ones, for the reason that it is not properly managed, and meddled with too much by opening to see the works.

Setting the Hands.—The important thing here is to have a key that fits the post and to have the key clean. The hands may be turned backward or forward at will; it will do no harm, although the popular idea is the reverse of this. How people came to get the impression that turning the hands of a watch backward is injurious, is difficult to determine; probably from the fact that the minute hand of a striking clock cannot be turned back past XII.

How to Wind a Watch.—It is best to form the habit of winding a watch at a certain hour, once in the twenty-four. The best time is when taking off the watch at night. It is not so likely to be overlooked then as in the morning, for sometimes one oversleeps and prepares a toilet in a hurry.

Obtain a good key, and one that fits perfectly. An experienced jeweler says that when the key is not properly fitted, it slips off, giving the whole train of wheelwork a severe jar from recoil; its effect on the watch is similar to that produced on the wearer when he sits down on a seat which is about four inches lower than he expected.

After a few such shocks, in winding it will be found to slip back occasionally, and unless timely repairs are made, it will some day go down with a crack, that will involve an expense of several dollars to repair it as it should be.

A key, all brass, properly fitted, is the best; a key with soft steel pipe is the next best and a hard steel key worst of all. The soft key will not spoil your watch, for if either give way it will be the key, leaving the square of the watch perfect.

Hardened keys will not yield to wear, consequently the watch must, and if the winding square be spoiled, no poor workman can replace it properly, and a good one only at considerable expense; experience will prove keys to be cheaper than winding posts.

The key should be applied clean. The habit of blowing out dirt from the cavity will prove injurious if the metal is placed close enough to the lips to be moistened, as it will be transmitted to the post and cause rust.

Breaking Main Springs of Watches.—Many people believe that winding a watch up with too much force will break the main spring. This is not the case. A main spring can never be broken by winding, if provided with a stop, as nearly every watch is. The watch, of course, can be broken in some part by hard winding, perhaps the hook or chain, or teeth of the main wheel,

Why main springs break no one has yet fully determined, although several theories have been offered. As jewelers generally get a "run" of broken springs at certain seasons of the year, it is believed that certain conditions of the atmosphere, perhaps electric or hydrometric, produce the annoying breakage.

Regulating a Watch.—Some believe that the regulator is put in the watch for the use of the watchmaker, when, the fact is, it is principally for the convenience of the owner. The plate over which the regulating rod works is marked for fast at one side, and slow at the other, perhaps with simply the letters F and S. Should the watch be going too fast, move the regulator a trifle toward the "slow," and if going slow, do the reverse; you cannot move the regulator too gently at a time, and the only inconvenience that can arise is that you may have to perform that duty more than once.

General Care of Watch.—Don't open the watch to show every friend how nice the works are. Open to the machinery only when absolutely necessary, and that is almost never. Do not allow the watch to run down. Keep it in as uniform position as possible. If it lies on any surface, let it be with face up, and pendant ring turned under, so as to keep the upper part most elevated.

VIOLIN AND FLUTE.

Keying Up a Violin.—Keep the instrument always tuned up to concert pitch. Many, especially country fiddlers, have an idea that they save their strings by loosening them when they are done using their violin. This is quite absurd; for the string is almost certain to break when it is again put up to proper pitch, says an experienced violinist.

Selecting Violin Strings.—Many strings are injured by rubbing them with pumice stone to make them look nicely and by bleaching them with sulphur. Strings can be good and at the same time have a good appearance, but care should be taken to discriminate between those that have been pumice stoned and sulphured, and those that have a naturally fine appearance, which they will have if the stock is good and properly manufactured.

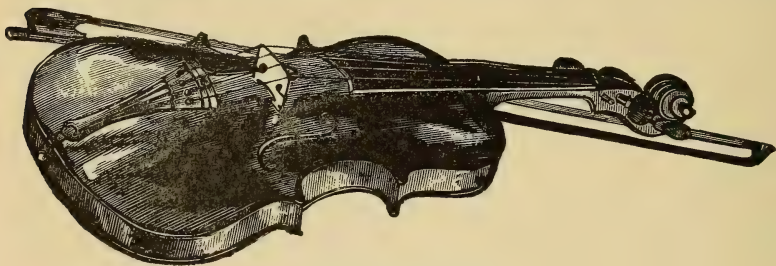
Four-thread strings are usually false; so three-thread strings are preferable. A false string can readily be detected by taking a length between the thumb and fore-finger of each hand and then snapping it with the little finger of the right hand. If its vibrations are regular, causing it to form only two lines, it will not "squeak," but if its vibrations are not regular, and cause it to form a third line (which can easily be distinguished vibrating between the two outside lines), the string will squeak, and is absolutely worthless.

The very best strings are generally a little "off color," and dark strings are

the strongest. In selecting strings decline those of a yellow cast when this color has come from saturating them with old rancid oil.

How to Put on Violin Strings.—Always put the small end of the strings nearest the tail piece. In adjusting the strings to the peg do not tie it, but simply put it through the peg, and then dip it once under, toward your left hand, and by turning the peg the string will then become fastened without further trouble.

Leave no superfluous string dangling, or wound around the head for future



VIOLIN AS IT SHOULD BE STRUNG UP.

use. Many persons labor under the mistaken idea that they save their superfluous string by leaving it wound around the head of the violin or tail-piece, to be pulled through after it breaks; but this is poor economy, as the string becomes dry and rotten by being long exposed to the air. Moreover, that part of the string which comes in contact with the pegs or tail-piece will become so jammed as to unfit it for use as far as tone is concerned. Fit up the instrument with a clean look, as represented in the engraving.

Improvement of Violin Strings.—Just before using an old, dry string, the application of a very little fresh sweet oil (or still better, the oil of almonds) will infuse new life and give it a clear, crystal like appearance, and at the same time add much to its strength and durability. The oil should be carefully wiped from that portion of the string that comes in contact with the bow, with a soft cloth; the bow should be well resined and often, and the resin wiped from the bow stick before and after use.

Specks in Violin Strings.—The same writer says that little specks in strings are sometimes considered as indications of weakness; this is another old fiddler's whim. Most strings having become seasoned (and they should become well seasoned before using) will look a little speckled. This only indicates that they are not too green, and are much better for use.

Winding of the G String.—Silver-wound strings always have a dull, metallic sound. Copper wire is the best always for the G string. The intestine should be well stretched before winding, and then the wire will not be so apt to become loose and jar. A little oil, however, will usually remedy this difficulty.

Varnish and Stain for Violins.—The recipe for violin varnish, as used by German violin makers, is four parts of sandarac resin, two parts shellac, one part mastic, two parts benzoës resin, two parts Venetian turpentine, and thirty-two parts of alcohol. The solid ingredients are first dissolved in the alcohol and the Venetian turpentine added afterward, and finally the whole carefully filtered to get rid of all dust. Brushes to be kept scrupulously clean. For staining, Campeachy wood is used, mixed with about one quarter yellow dye wood, and boiled for about two hours in five times its weight of water in a copper or earthenware vessel; no iron should come in contact with it, as this makes the solution black. The violins are colored with this solution when well cleaned, and afterward varnished. (See page 171.)

Oiling a New Flute.—An old musician says: Aoint the flute thoroughly and repeatedly with pure, raw linseed oil, prepared by letting it remain unshaken for several weeks, when the clear oil should be poured off for use. Pure olive oil will do better, but it must be oil of olives. It should be applied inside and out every time the flute is put away, it having been carefully cleaned from moisture for the first year, after which an application once a month will be sufficient.

On taking the flute from its case for use, the oil should be wiped out with an old silk handkerchief (cotton will do for the outside) wrapped tightly around a stick, using as much friction as possible.

To Stop Cracks in a Flute.—To stop cracks that have already appeared, pack them full with good beeswax, which has been mixed by melting and stirring with a small portion (say one sixth) of resin, sufficient to stiffen, but still leave it viscid; apply when cooled and cram it in with the finger. Do not be tempted to use shellac or any rigid cement, as it will fail on account of the distention and contraction of the wood by change of temperature. It is well to pass your thumb over the cracks, filled as above, before commencing to play, the object being to smooth them down and insure their being tight, which rigid cement will not admit of.

HOW TO MANAGE A GUN.

Corking a Gun.—To make a gun do its part well, it must be kept in good condition for service. There is a mistaken idea very generally prevailing, that a gun needs cleaning every time it is used, or rather after having been fired a few times. The better way is to so manage that it will not get foul, and to do this obtain good powder, and then keep the barrel tightly corked when not in use. I have used a gun for a long time, firing it more or less every week, without cleaning or wiping out the barrel, and yet always having a clean gun,

The collection of burnt powder along the interior of the gun is soft and oily when the deposit is made and will not harden up so long as the piece is in use—providing the powder is a good article—but when allowed to stand, the action of the atmosphere dries up the collection into a hard crust, and every time a load is discharged thereafter the accumulation increases. Now by corking the muzzle perfectly tight as soon as the piece is to be set away, and putting a bit of rubber upon the tube beneath the hammer, the burnt powder will not cake up as air is excluded.

Watts evidently did not understand this matter when he wrote the following :

“ If fired only once a day,
 ’Twere wrong to put your piece away
 Unwashed, because you’ll always find
 Some filth corrosive left behind.
 And so as you from sport return—
 (The following words let each one learn,
 Seeing them all in order done),
 Feed dog—feed self—and clean your gun !”

How to Clean a Gun.—To wash a gun use warm water and a tow swab fastened on the end of an elastic rod. Work this up and down, adding water until the liquid comes out pure and the tow unstained. Then fill the barrel full of boiling water, invert the gun and let all the water drain out of the muzzle ; set it by the stove until well dried, then wipe out briskly with tow and follow with a swab which is very slightly dampened with sweet oil. If the tube is not entirely dry, burn a cap or two upon it before the last wiping and oiling takes place. Wipe well around the hammer and lock, then dry the part by the fire and oil lightly.

Protecting Outer Surface of a Gun.—People differ in opinions respecting management of the outer surface of the barrel, but there are few, if any, who like a bright one. In sighting over a polished tube, the glare of the sunlight fatigues the eye and diverts the aim. This is so well known, that no true sportsman would think of polishing the barrel of his rifle or fowling piece.

My plan has been to allow the slightest show of the rust to appear and then rub the iron with a woollen cloth moistened with oil ; this gives a dark gray appearance or dead color that will not reflect strong sunlight.

Murcurial ointment is said to be one of the best materials known for preventing rust on gun barrels, but I have never tried it ; it should be rubbed thoroughly outside and well dried off, so as to leave but little on the surface. The quicksilver forms a thin film which protects the metal from moisture.

Browning a Gun Barrel.—There is a process for browning a barrel which is said to be effectual, but it requires considerable care in performing the same. The barrel is first thoroughly cleaned and made free from grease by use of a little potash dissolved in water. Then take one ounce of nitric acid and one ounce of blue vitriol, dissolved in four ounces of soft water, and mix all

together in a pint of water. Warm this mixture slightly, and apply it gently with a sponge.

The gun barrel must now be set away in a dry place, all night, when a film of oxide will be formed upon it in the morning. This film is now rubbed off with a scratch-wire brush, and another application of nitric acid solution is made; and so on, three times successively, when a coat of oxide of sufficient depth will be formed. The gun barrel is then brushed thoroughly, afterward washed with a little lime water, to destroy any free acid that may remain in the pores of the metal. When dry, the barrel is again rubbed with a stiff hair brush, and is fit for varnishing.

To Prevent a Gun Bursting.—Out of one hundred cases of double barrelled guns bursting, nine-tenths noted have been traced to a defect in the left barrel. The reason is simply that the right one is most frequently used and reloaded, perhaps ten times to the left being discharged once. Every time the right barrel is discharged the gunpowder in the left is pulverized more or less by the shock, or the wadding moved up a trifle, which leaves a space between the charge and wadding. Naturally when the left barrel is discharged it explodes. These accidents can be avoided by sending the ramrod home with one or two smart blows into the non-discharged barrel every time the other is reloaded.

Handling a Gun.—The *American Sportsman* gives some most excellent hints regarding the handling of a gun, the substance of which is as follows:

Always handle a gun as if it were loaded; never let it point at yourself or any one; never point your gun at any living thing unless you mean to kill. Always carry your gun at half-cock; never with the hammer upon the cap. Half-cock your gun; if it will pull off in this condition, take an ax and split the stock, bend the barrel and sell it for old iron.

If it will not pull off, put a cap on the cone and let the striker down upon it; now strike the back of the hammer with a stone or against the door jam, and if the striker fits the cone decently well, the cap will be exploded. This is what happens when a man carrying a loaded gun with the striker down upon the cap, shoots himself, while riding in a wagon, in tumbling down, or climbing over a fence or stone wall.

Put a cap on the cone and let the striker back almost to half-cock and let it fall. If the main spring is good for anything, the cap is exploded. More accidents happen in this way than in any other. A gun is carried through underbrush, dragged out of a boat, pulled on the ground by the muzzle; your dogs jump upon you, the hammer catches in your clothing; in either of these, and in a hundred other ways, the hammer is liable to be drawn back almost to half-cock, and then let fall upon the cap. If it is a good one an explosion ought to follow.

Now, half-cock your gun, draw the hammer back nearly to full cock and let

it fall. It will stop at the half-cock notch, and no blow is given. So always carry your gun at half-cock. If you cock it expecting to get a shot, and are disappointed, hold the muzzle straight up in the air, and let the cock back at half-cock.

If you know of no other way of ascertaining whether a gun is loaded or not than by putting it in your mouth and blowing, or if you feel inclined to draw the cap, retire to a safe distance, and at once blow out your brains before you kill or maim other people by stupidity or carelessness.

How to Load a Gun.—Set the piece at an angle of about forty-five degrees, holding it with the left hand. The gun should be in this position for convenience in pouring in powder and shot, but should be brought perfectly erect as the wads are pushed down so that they will set squarely upon a level bed.

Act deliberately, no matter how anxious you may be to get ready for firing. If a muzzle loading shot gun, there are more chances for mistakes in charging than if a rifle, but it is not unfrequent that excitement has led to ramming a bullet down without powder beneath it. It should be remembered also that the bullet does not rest upon a solid bed until the rod will bound.

The wad in a shot gun upon the powder should be well bedded down, but that over the shot pressed down with only sufficient firmness to hold the shot in place.

Before loading a gun that has been standing unused for some time, explode a cap or two upon the nipple to make sure there is no stoppage. In loading a double-barreled gun, charge each with powder, right first, left second, and then ram down a wad upon the top of each, leaving the rod in the last, until the shot has been put in the first. Then put on the top wad, and leave the rod in that until the shot has been put in the other. This precaution will prevent the liability of getting both charges of shot into one barrel.

Young hunters who get the "buck fever" are liable to all sorts of mistakes in the handling of a gun, but by beginning right at first, they will be likely to keep so.

To Keep a Gun from Rusting.—Clean the barrel occasionally and cover the exposed portions of the metal with a film of linseed oil. For lubricating the lock, purified olive or sperm oil is the best. It is also a good plan to give a gun an elevated position in the room where it is kept. It lessens the chance for rusting, as the atmosphere is warmer and dryer at the top of the room, and besides, the gun is out of the way of children.

To Make a Ramrod.—It is necessary that a ramrod be perfectly straight, therefore it is best that it be made from a split stick of straight grained hickory. Lay it upon a level surface and plane it square, working by straight edge lines; then take off the corners, and by means of glass and sand-paper, scrape and polish until it fits the barrel and stock socket. Do not use a knife upon it,

BOW AND ARROW MAKING.

The Indian Bow.—As the Indian bow is considered the most powerful and best, a description of its construction will be a good guide for making one for civilized use. The Indian bow is generally four feet long, one and one-half inches wide, and an inch thick at the middle. It tapers from the center toward the ends, and is but half an inch wide and half an inch thick at the extremities.

At one end, the bow string is notched into the wood and made permanently fast, while at the other end two notches are cut, and the string at that end of the bow is made like a slip-knot or loop.

When the bow is to be used, the warrior sets the end to which the string is made fast firmly on the ground, and then bends down the other end until the loop slips into the notch. It is never kept strung except when in actual use, as it would lose its strength and elasticity by being constantly bent. The wood used is ash, hickory, ironwood, elm and cedar. All of the wood, save cedar, requires seasoning, and is not worked until thoroughly dry. For the use of boys and beginners the size should be much reduced.

A Fancy Bow.—The Indians do not generally put a very attractive mechanical finish upon their bows. The weapons are made for practical purposes and not for ornamentation. The bow made after the fashion given may be attractively finished by giving the inner surface and the edges an oval shape. After smoothing up, rub with a woolen cloth dampened in linseed oil, then glue to the central part of the bow a strip of green or red velvet six inches long.

How to Make an Arrow.—The arrows must be of well seasoned sticks, perfectly straight and of exactly the same length, for if of different lengths, they fly differently, and unless made in all respects alike, the aim is destroyed. The shafts being made even, the next work is to form the string-notch. This is done with a sharp knife, and when made properly, the bottom of the notch will be precisely in the center of the shaft.

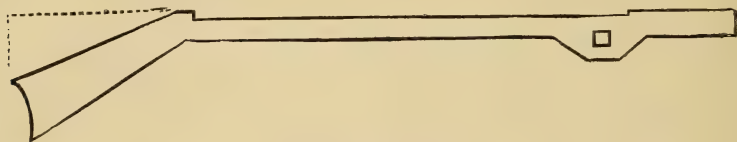
Heading the Arrow.—Blunt arrows are used for shooting at a mark, etc., but when used for game, steel points or heads are put in. Where the heads are used, a slit is sawed opposite the notch end and the stem of the arrow-head inserted and held by binding with thread. The slit must be exactly in the center.

Feathering the Arrow.—The next process is to put on the feathers. To do this properly, great care must be taken. Turkey quills are soaked in warm water to make them split easily and uniformly. The reather is then stripped from the quill and put on the shaft.

Three feathers are placed on each shaft and laid equidistant along the stem. The big end of the feather is fastened near the notch of the shaft and laid six inches along the wood. The feathers are glued to the arrow.

HOW TO MAKE A CROSS GUN.

Laying Out a Cross Gun.—For a medium sized gun, take a board—whitewood is best—thirty-three inches long, six and a half inches wide and an inch thick. Laying the board down flat, measure from left upper corner down, as shown in dotted lines, three inches, then to the right eleven inches, and draw line from these two points across the board. This gives the slope to the upper part of the stock.



CROSS GUN LAID OUT.

From the lower left hand corner of the board, strike a line up to within an inch and a half of upper edge. Measure down from upper right corner, one and a half inches, and draw a line, which forms the barrel of the gun. Three inches from front or muzzle end begin the projection for the bow mortise. The gun at this point should be two and a half inches wide, and the under surface three inches long. Make a three quarter inch square mortise in center for the bow, or the mortise may be one inch up and down and three quarters of an inch wide.

To cut the arrow groove, the stick had better be taken to a carpenter, who, with a match plane or carpenter's plow, will groove it in five minutes as it should be. Unless the arrow channel is true, the gun will be a worthless affair. It cannot be dug with knife or gouge so as to be straight and smooth.

Three Part Cross Gun.—Where a plane cannot be obtained for cutting the arrow groove, the gun may be made of three pieces, and that tool not needed. Take two pieces of board, one fourth inch thick, and one board, three eighths thick, and screw them together. The three eighth piece in the center, sink three eighths of an inch below the top edges of the others, which forms the arrow channel, screw them together solid at such points as will not come on the lines for marking out, and then proceed as with the board described under head of "Laying out a Cross Gun."

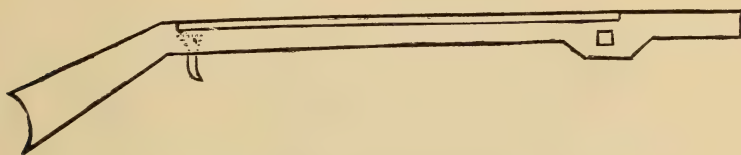
Cross Gun Cap.—Most boys like a cap on the top of the gun to give it more of the appearance of a rifle. This is easily done by taking out a little wood for the string to work in, and putting on a thin cap. The first illustration shows how to cut the string place, and the second the cross gun with the cap on.

The Cross Gun Bow.—The length of the bow should be decided by the length of the gun. A bow for the dimensions I have given should be about

thirty-two inches long. It is a very good rule to make the bow twice as long as the distance from the trigger to the mortise. As to making the bow, wood to be used, etc., see "How to Make a Bow." When setting the bow, have its right angles stand true, that is, each side at direct angles with the gun.

Cross Gun Trigger.—When making the gun out of a solid board, make a trigger mortise through the gun at point of string-notch. Where three pieces are used, leave out center piece for an inch or more at string-notch. Shape the trigger as shown in dotted lines on cut, and put the pin through near the front, so that by pulling it back the upper surface is lifted to displace the string.

The Elastic Cross Gun.—A stiff bow may be made and rubber strings used to force the arrow. I say strings, for the reason that two should be



CROSS GUN WITH CAP PIECE.

applied, one at each end, connected by a cord in the center. If rubber is made to cross the gun, it will soon wear out. If the bow is bent a little circling, the convex or swelled side toward the butt of the gun, all the better. This will give a stronger action to the elastic strings.

Finishing Up a Cross Gun.—The gun can be made to have a finished appearance and to appear lighter than it really is, by rounding the under side of the barrel part and finishing the stock on both edges. If one prefers, the breech may be made after the style of a rifle, and the barrel made round.

There is no need of having a cross gun cumbersome. The barrel part may be cut away, so when finished up it is only inch and a quarter; but inch and a half is better, if rounded up on bottom only.

Cross Gun Arrow.—The arrow should be perfectly straight and of hard wood. Split out the stick twelve or fifteen inches long, then plane two sides level, and with a straight edge draw two lines with distance apart to equal the thickness, which should be but a trifle less than the width of the groove. Do not attempt to round the arrow after it is dressed out, but leave it square, and do not brad the end, for it then becomes a dangerous missile. If the groove of the gun and the arrow are both true, very accurate shooting may be done.

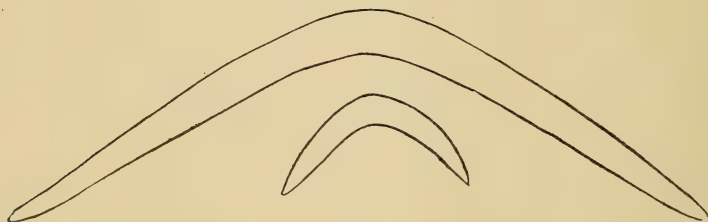
How to Sight a Cross Gun.—Where the top cap is put on, the gun may be very easily sighted. Fasten the gun in a firm position—screw it in a vise if you have one, then shoot the arrow several times at a board set up in front of it, twenty or more feet away, according to strength of bow. It will be found that the different arrow marks will be very close together. Get the

central point, and then sight the gun to that spot without removing the weapon from its secured position.

Let a piece of hoop-iron, one-fourth of an inch wide and three-eighths of an inch high, in the butt of the gun, just back of the string-notch, and with a three cornered file cut a notch in it to sight through. This done, set a bit of lath nail at the front and file this down, until by bringing its point into the notch, when sighting, it is on a direct line with the spot where the arrows struck.

SMALL WEAPONS.

To Make a Boomerang.—It is generally supposed that this very peculiar implement can only be made by those who are natives of Australia, who discovered its peculiarities by throwing crooked clubs, but such is not the case, as there are no prescribed dimensions or shape in its construction, further than that it be a stick so bent that it has a concaved and convexed side, as represented in the illustration. I have made them from crooked limbs of trees and



THE LARGE AND SMALL BOOMERANG.

from sticks dressed out and bent into shape by steaming. Before bending, the stick, two feet long, or any length you choose, should be gradually tapered from center to ends, which should be small. By use of the jack knife the stick may be made easy to the hand when throwing.

To Throw a Boomerang.—Take the implement in the right hand as you would a light ball club or hammer; have the hollowed side downward, or away from you. Fix upon some object a good distance away, then raise and hurl the club at the mark with all your might, somewhat upward, and then watch the eccentric operations of the boomerang. It will not go where you intended to have it. Perhaps it will take a sudden turn to right or left, as if it were acting from a new impulse, or it may turn suddenly and come dashing back to the thrower. Never use the boomerang where there are people or animals about, for only an expert in its use can determine its course.

The Paper Boomerang.—A diminutive boomerang may be made from a bit of card board. Cut from a common visiting card the toy represented in the small engraving, and just that size. Lay it upon the large part of the

left thumb, the hollow side from you, and one end projecting over sufficiently to snap it with the middle finger nail of the right hand. Fire it somewhat upward, and you will see it abruptly return back after going a yard or so from you.

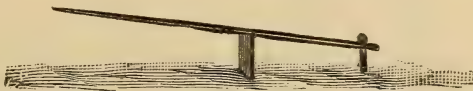
The Crotch Sling.—This is a little device by which a stone may be thrown a considerable distance with violence and precision. To make it, cut a notched stick in diameter the size of the finger, the two prongs three or four inches long, and the bottom part with sufficient length to hold in the hand conveniently. To the ends of the prongs attach elastic strings with considerable resisting power, and to the two rubber ends fasten a piece of leather cut chestnut leaf shape with a hole in the center, after the manner of the common sling. To shoot it, hold the stick in the left hand, put a stone in the leather piece, then draw it back with the right hand, and let it fly.



THE CROTCH SLING.

To Mold a Lead Cannon.—When you have determined upon the size you wish to make the cannon, whittle out a round stick of the proposed size, in the form of a pop-gun ramrod. If the cannon is to be three quarters of an inch in diameter, and four inches long, have the stick that size eight inches long, one half the length cut down to one fourth of an inch in size, and made round and smooth. Now wrap the stick with letter paper, by rolling it on smoothly, and wind the large part with string. Set this upright in an auger hole and pour in the lead. The lead should come above the end of the stick at least one fourth of an inch. The fuse hole may be made by having a little wooden pin go through the paper to extreme end of the mold stick.

The Flip Stick.—Take a board six inches wide and a foot or so long, set it on edge, and secure it there by stakes or any other means. Eight inches from this set a brick on edge, or a block four inches high. Across the wider board lay a stout piece of hard wood, eighteen inches long, an inch thick,

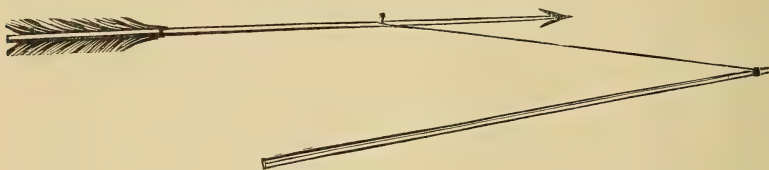


THE FLIP STICK IN POSITION.

and an inch and a half wide, and upon the lower end place a round stone; then strike the opposite end with a club, and the stone will be thrown high in the air. By boring a hole half way through the lower end, a rest will be given for the stone. The upper edge of the stationary board should be rounded.

Swift Errand Jack.—Bend over a small sapling and divest it of limbs. Holding the topmost end near the ground set a crotched stick astride the pole, then let the tree suddenly go. The sapling in whipping back to place will throw the jack high in the air. A few trials will have to be made to get the right position or incline to the crotched stick. By attaching strips of red and white cloth to the jack for streamers a much better effect is obtained so far as the sight of the messenger is concerned. At night a fuse may be fastened to the jack as he goes on his swift errand.

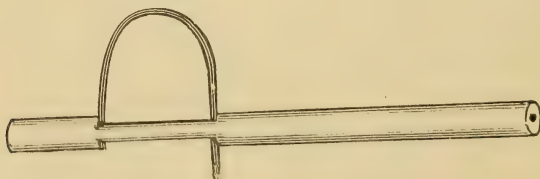
How to Make a Dart.—Make an arrow same as for the bow, only feather heavier, and on two sides only. Point the front end with a taper not more than an inch long. Cut a notch at the balancing point with an incline front, like the notch in a crochet hook. Take a stick a little shorter than the arrow, and tie a small, stout string to it six or eight inches long, with a knot at



THE DART AND DART STICK.

free end. Place the string in the notch, and holding the arrow end in left hand and the stick in the right, draw the string tight and hold it so, then after two or three sweeping motions of the body and arms, let it fly. When a boy, I used to throw darts over the tops of the tallest trees.

To Make the Spring Gun.—Take a piece of elder bush of any length that can be obtained between joints; punch out the pith, then cut as represented in the illustration, and put in a spring of whalebone or tough hickory. The stick to be used as a missile should be made in length and size to corre-



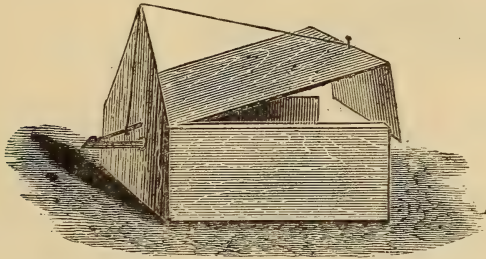
THE ELDER SPRING GUN.

spond with the gun. It is discharged by drawing back upon the spring end at the bottom, and then letting it suddenly go. Where an elder bush cannot be readily obtained, a piece of bamboo may be used, but it should be of small size.

TRAPS AND TRAPPING.

The Steel Trap.—The most convenient device for capturing most kinds of animals is the steel trap, but there are places where other styles are much better, and of these I shall speak specially.

How to Make a Box Trap.—For the bottom, cut a board fifteen inches long, and eight inches wide; two side pieces same length and seven inches wide. Nail the two side pieces to bottom, then take for back end a board eight inches wide and eighteen inches long. After fitting in, bevel the sides so that the upper end will be but half an inch wide, and in this cut a

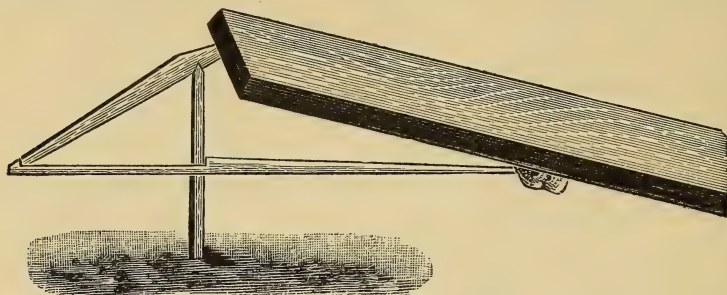


COMMON BOX TRAP.

notch for string. Next fit a top board, eight inches wide, or a little less, so that it will work between the sides easily. Cut this short enough, so that when the front end piece is nailed on, it will make a good finish at that point. Round the corners of the cover a little at back end, so that the lid will work easily. To hinge it, bore a small hole on each side through the side board at rear end into the cover, and put in wooden pins or wires. By boring the holes in the top or cover board a little larger than those in the sides, the hinge pins will keep their places securely, and the trap-board work with ease.

At the center of the box, at the back, bore a half inch hole for the spindle to pass through. Make the spindle of good hickory ten inches long, and in the center make a hole through it, and put in a piece of stiff wire an inch long, or a lath nail with head taken off. An inch or less from the end of the spindle cut a notch for the catch. In the back end board, about three inches above spindle hole, cut a notch also, then make the catch of right length to reach from notch to notch. Drive a nail in the center of the top at the front; tie a string to this, pass it through the notch at the elevated point of rear end board, and tie on the catch stick at a point where the trap-lid will be elevated about as illustrated. To set the trap bait the spindle and pass the notched end through the hole from the inside. This trap is of right size for rats, squirrels, chipmunks, etc. For rabbits and other game of larger size, the trap must be proportionately increased in its dimensions.

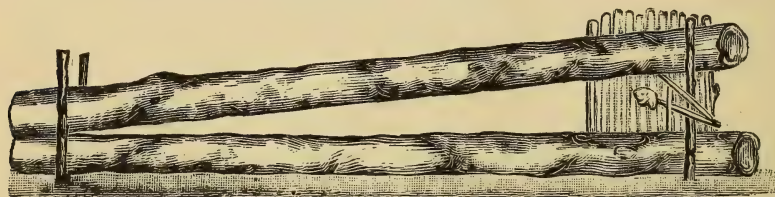
The Figure Four.—As the figure four is used upon various devices in way of traps, I give an illustration of the sticks in position, so that the inexperienced boy will have no difficulty in making one. The only tool necessary is



THE FIGURE FOUR AND PLANK TRAP.

a common pocket knife. The best material for the figure is seasoned hickory. It may be made of any size one desires, and there are no set rules as to proportion.

How to Make a Dead-fall.—All the tools necessary to make a dead-fall are an ax and pocket knife. Cut two poles six inches through and about ten feet long. Place one upon the other, and hold them in position by driving stakes on each side near the ends. The stakes should not bind the upper pole so as to interfere with its being raised up and let down freely.



CHEAPLY CONSTRUCTED DEAD-FALL.

Near one end drive a row of stakes in a semicircle of about fifteen inches, the terminus at each side being the poles. These are to prevent the game getting at the bait without going between the poles. They should be two or more feet high and driven not more than two inches apart.

Now you are ready to set the trap. Lift the upper pole and place a figure four beneath it, with the spindle baited and pointing obliquely into the inclosure.

The bait should not be more than six or eight inches from the pole. If too far away, the animal will pass the trap before springing it. For very large game, logs instead of poles are used.

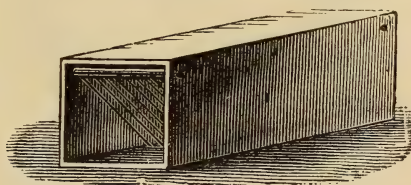
How to Make a Spring Pole.—Sometimes when catching small game with the steel trap, it is best to get the animal out of the way of others that will devour it if held fast on the ground, and this may be done by means

of the spring pole. If convenient, trim a small tree free from limbs, bend it over and bring the extreme top to the ground. To this, a few inches from the end, fasten the chain of the trap and then place the point of the pole or staddle under a catch previously prepared, by driving a stick firmly into the ground with a projection upon it. Make the catch just sufficient to hold the string pole, and so that it will loosen and fly up when the animal jerks upon the trap. Thus the game will be suspended out of reach of hungry quadrupeds.

Clog for a Trap.—*The Trappers' Guide* very sensibly warns hunters against chaining a trap securely when taking large animals, as some of them, if caught in a trap that is staked fast, will pull their legs off, or beat the trap to pieces; but if allowed to drag the trap about with a moderate weight attached, will behave more gently, or at least will not be able to get loose for want of purchase. The weight used in such cases is called a *clog*. It is usually a pole or a stick of wood, of a size suited to the ring of the trap-chain, and to the size of the game.

As the object of it is to encumber the animal, but not to hold it fast, the chain should be attached to it near one of its ends, so that it will not be likely to get fast among the rocks and bushes for a considerable time. The usual way is to slip the ring over the large end of the pole and fasten it with a wedge. The animal will not be likely to drag it any great distance, and can be easily trailed.

The Tube Trap.—When a boy I made a trap for capturing muskrats and other small animals, which proved very successful. It was simply a box three feet long, six or eight inches square, with wire drops at each end. A



THE TUBE TRAP.

roller or movable stick is fitted into each end, and by gimlet holes wires fastened thereto large enough to incline at forty-five degrees, as shown in the illustration.

The animal lifts the drop in going in from either end, but cannot get out. When set at the hole of an animal, capture may be expected. Wind the hinge piece with wire to prevent an animal gnawing it off. Make the box of old board and use old wires, such as pail bails, etc.

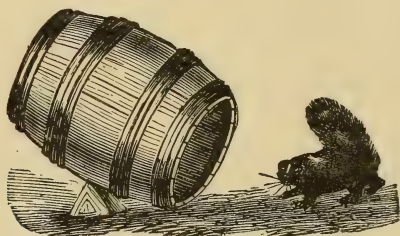
How to Make a Water Pole.—As aquatic animals, when taken in a steel trap, plunge to the bottom of the stream or pond, they may be easily kept there and drowned, by use of the water or sliding pole. Cut a shrub or staddle a little longer than the water is deep, leaving six inches or more from the top two projecting limbs, that are nearly or quite opposite each other, cut them four

or five inches long. Trim the balance of the pole smooth, save immediately above the two limbs mentioned, then leave projections, but not so long but that the ring of the trap will slip over them when going from butt to top. At the place where the trap is set, force the top end of the pole into the bottom of the stream up to the long projections, then place the ring of the trap upon the pole, and secure the butt to the bank.

The animal can easily take the trap down with it, but the short spurs will prevent its going up again, and the two long spurs will make an effectual means of drawing the trap and game from the bed of the stream or pond to the bank.

The Plank Trap.—To catch rats, mice, moles and other small animals, the plank trap is well adapted. Take a plank or board a foot wide and anywhere from two to six feet long, according to the vermin to be caught, and place under one end the figure four, baited with cheese, as represented in cut of figure four.

The Barrel Trap.—The barrel may be used in several ways for entrapping animals. To catch the skunk, bore two holes with a gimlet in the center of the bottom, and with a string tie to the spot a piece of meat. Set the barrel



THE SKUNK TRAP.

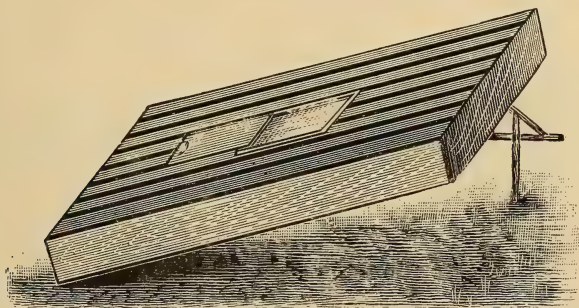
at an incline, as illustrated, so that the animal may get into it. When the skunk reaches the bottom, the barrel turns upright and the game is secured.

For entrapping rats, take a barrel head a little smaller than the barrel; across the center of the head screw or nail a stick half an inch square, projecting an inch each side. Round the parts which project, then cut notches in the top of the barrel for these to fall into, so that the head will be suspended in proper shape, but touch the staves nowhere. If it is not a perfect balance, add a little weight to one side to make it so. Tie cheese to each side, then set an inclined plank so that rats can run up to the end of it and jump down upon the balanced head to get the bait. Of course Mr. Rat goes into the cavity below, and the head swings back into place for the next.

The Pit Trap for Rats.—With a post auger bore a hole as deep as you can in a cellar bottom or out of doors where rats run. Take away all the earth removed, and make the spot have the same appearance as before, as near

as possible, and put a ring of corn meal around the hole. If vermin are plenty and hungry, you may be sure of two or three tumbling in, and the fuss they will make about it, will be the cause of many more going down.

How to Make a Bird Trap.—Take two boards six inches wide and four feet long, and two more same width and about three feet long. Nail them together into a frame. Across the top nail laths or strips of thin board, so that there is a space of one inch between them. In the center, on top of the laths,



CHEAP HOME MADE BIRD TRAP.

fasten by nailing or screwing two pieces of board, eight inches long, two inches wide and half an inch thick. Place them six inches apart, the edges beveled under. Cut out space between these boards and fit in a half inch slide board, beveled so as to fit the first. This is for an arm hole to take out the birds.

Set the trap with a figure four. In my boyhood trappings I found it a good plan to place the trap so that it would not spring, and allowed the quails to eat grain beneath it until they became familiar with it. On the end of the spindle put a very small nubbin of corn. It is not a bad plan to strew straw about the trap to attract game.

How to Make a Snare.—Take a piece of chalk line or clock cord, about two feet long. Make a loop at one end that will slip without drawing into a knot. Tie the other end to an elastic rod or spring pole, where it has grown, or been firmly stuck in the ground; then at the point where the rod or pole will reach the earth when bent over in a half circle, drive both points of a crotched stick into the ground to act as a hold for the snare. Near this crotch, say three inches away, stick down a five inch circle of sticks, half an inch apart and four inches high. Now make a spindle long enough to reach across the crotch, and to the center of the circle, then a catch stick like the one on the box trap, and fasten to the cord three or four inches from the end of the spring pole. Now the snare is ready to set. Holding the pole down with the arm, place the baited spindle across the opening of the crotch, slip the catch through from opposite side, and place one end of this on the head of the crotch, the other upon the spindle, then loosen up on the spring pole. The catch stick will

be pulled tight enough to hold the spindle in place ; now lay the loop end of the cord around the circle of sticks, drawn up so it stays just at the tops. The rabbit or other game, in getting at the bait, puts its head into the circle, and, of



A SIMPLE SNARE TRAP.

course, through the loop. The moving of the spindle loosens the catch stick, up goes the spring pole, taking the rabbit suspended by the neck. Remember, the loop end of the cord must not be passed under the crotch—only the catch stick. When the ground is frozen, the circle of sticks may be made in a piece of board.

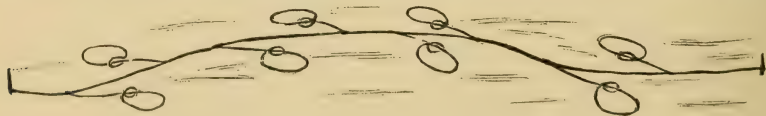
The Slip Noose Snare.—To capture birds that run in flocks upon the ground, the rustic fence and slip noose snare works very well. The best place to use it is about piles of brush or where the birds are known to run. Build a little brush fence, tight enough to prevent a bird passing, excepting at certain intervals, where openings are left by shoving two crooked sticks into the ground crossing at top. Tie a small cord to the cross, then form a slip noose, as shown in the engraving. The string can be caught upon the bark of the sticks or upon a sliver made with a knife.



SLIP NOOSE SNARE.

Grain may be used to lure the birds. Once in the noose, they are fast.

The Line Snare.—For catching birds alive, the line snare answers a good purpose. Stretch a large cord between two stakes, set some distance apart, then to this attach short slip-noose strings and strew some sort of grain



THE LINE SNARE FOR BIRDS.

over the spot. When a bevy of birds run over the snare some of them are very likely to get their feet into it and find themselves caught. Horse hair may be used for the slip-nooses when small birds are to be taken. The trap should

be watched from some secret spot, so that the game may be relieved as soon as taken, otherwise they may flutter until they get loose or injure themselves.

To Trap the Fox.—The trap should be set near the haunts of the fox, says *The Trapper's Guide*, and covered with ashes, chaff, or light earth, and it should be fastened to a movable clog of six or eight pounds' weight, as directed under head of "clog for traps." Wool, moss, leaves, or some other soft substance, should be packed lightly under the pan and around the jaws. The surface of the earth in the neighborhood of the trap should be brushed with a quill or bush, so that all will seem natural.

Scraps or small pieces of fried meat, rolled in honey, should be scattered over the bed of the trap, except where the pan is. Care should be taken to erase all footprints.

Another method practiced by woodmen is to set the trap in a spring that does not freeze over in winter, placing it about half an inch under water, and covering the space within the jaws with a piece of moss that rises above the water. A bait of meat should be placed in such a position that the fox in taking it will be likely to put his foot on the moss to prevent wetting it.

Foxes feed on grouse, small birds, hares, rabbits, squirrels, muskrats, mice, fish, eggs; and some of them are remarkably fond of grapes, strawberries, and other ripe fruits. When pressed with hunger, they accept reptiles and carrion. Their modes of securing their prey are various. They generally seize their victims by creeping stealthily within springing distance, and pouncing on them like a cat.

To Trap the Wolf.—For capturing the wolf by the steel trap, the directions given in the first method of taking the fox should be followed, except that the honey should be left out, and the clog of the trap should be of fifteen or twenty pounds' weight. The small prairie wolf, that is so troublesome to the Western farmer, can be captured in the same way. Care should always be taken to keep at a proper distance when looking after the trap, as the wolf's sense of smell is very acute, and enables him to detect the footprints of the hunter with great sagacity.

Trapping the Skunk.—In addition to the barrel trap before given, the skunk, when infesting the neighborhood of a chicken coop, may be taken by means of the steel trap. Shut the coop so tight that the chickens cannot get out, then set the trap on the ground six or eight inches in front. The skunk is not a suspicious animal, and will blunder into the trap when prying around for a supper. Generally they will not emit their odor, and if shot through the spine before molesting, may be removed without leaving their scent.

Blowing Up Woodchucks.—In New England, where the ground hog is very troublesome, they have a way of killing the pest by means of a small magazine. A good handful of gunpowder is put into a cloth bag, to which a fuse is attached. The bag is then put into the woodchuck's hole some two or

three feet, with the other end of the fuse projecting from the hole, which is then filled in and carefully tramped with earth. If the burrow has other openings these must also be closed. The fuse is then lighted, a dull explosion follows, and the animal is never heard from again, being probably unable to breathe the air in his narrow house after the burning of the powder.

Trapping the Wild Cat.—St. John, the author of a work on Highland Sports, gives the following plan for taking it: "Like other vermin, the wild cat haunts the shores of the lakes and rivers, and it is, therefore, easy to know where to lay a trap for them. Having caught and killed one of the colony, the rest of them are sure to be taken, if the body of their slain relative is left in some place not far from their usual hunting ground, and surrounded with traps, as every wild cat who passes within a considerable distance of the place will surely come to it." For this purpose steel traps should be used.

The Turkey Trap.—Build a log pen in the woods where wild turkeys range, and cover the top of the pen with heavy poles. Then at one side, and at the bottom, make an opening sufficiently large to allow a turkey to pass in. It will be better to dig into the ground a little, to make the passway. Now string shelled corn along, from a little distance away into the pen through the opening. The turkey, in picking up the kernels with head down, passes under and into the pen. It will never find its way out, as it will make all its attempts upward.

Baiting Traps.—There is one general principle regarding baiting, says *The Trapper's Guide*, that is always applicable, and that is, never bait a steel trap on the pan. The old-fashioned traps were always made with holes in the pan for strings to tie on bait; and many, if not most novices in trapping, imagine that the true way is to attract the animal's nose straight to the center of action, by piling bait on the pan, as though it were expected to catch him by the head. The truth, however, is, that animals are very rarely taken by the head or the body, but almost always by a leg.

When an animal pulls at a bait on the pan of a trap, he is not likely even to spring the trap, for he lifts in the wrong direction; and if he does spring it, the position of his head is such, especially if the bait is high on the pan, that he is pretty sure to give the jaws the slip. Besides, bait on the pan calls the attention of the wary animal to the trap; whereas, he ought to be wholly diverted from it, and all signs of it obliterated.

Bait should always be placed so that the animal in attempting to take it shall put a foot on the pan. This can be done in several ways, all of which will be explained in detail hereafter. But this general direction may be given for all cases that are not otherwise prescribed for: Place the bait either on a stick above the trap, or in an inclosure so arranged that the animal will have to step over the trap to reach it.

To Trap the Mink.—Minks can be attracted long distances by a scent

that is prepared from the decomposition of eels, trout, or even minnows. These fishes are cut in small pieces, and put into a loosely corked bottle, which is allowed to hang in the sunshine for two or three weeks in summer, when a sort of oil is formed, which emits a very strong odor. A few drops of this oil on the bait, or even on a stick without bait, will draw minks very effectually.

The chain of the trap should be fastened to a spring pole, strong enough to lift the animal, when caught, out of the reach of the fisher, fox, and other depredators; or if the trap is set near deep water, it may be attached to a sliding-pole, which will secure the game by drowning it.

Where the mink is molesting the chicken coop at night, dig a hole in front of the coop sufficiently deep to allow the top of the steel trap to come level with the top of the ground. Smoke the trap well before setting it; then cover the trap, chain and all, with grass or leaves, or something that will not excite his suspicion, and when he comes that night he will conclude to stay.

If you wish to trap minks along the creek, set the trap in the edge of shallow water, and cover with wet leaves, so that they will remain on it. Then suspend a bait two feet above it (the heart or some other part of a fresh chicken or bird), and in his efforts to get the bait he is almost sure to get into the trap.

Disinfecting Traps.—After an animal has been caught in a trap, it needs disinfecting before using again. This may be done by smoking it, smearing with fresh blood, or coating with beeswax. Put on fresh blood and allow it to dry, if that article is used. If waxed, melt the substance, and coat all the metal.

Simple Mouse Trap.—A common punch bowl may be quickly made into a trap for capturing mice. Take a piece of thin shingle about an inch wide and two inches long. From one end to the other, taper to center. That is, cut from both edges to a point, so that the stick will be one inch wide at one end and pointed at the other. Now bait the point and set the stick up edgewise, the bowl resting on the wide end, and the baited end coming under the bowl. The slightest touch at the bait will drop the trap.

The Mole Trap.—Drive some nails through a heavy board and file them sharp. Set the trap with a figure four, so that when it drops the pointed nails will fall upon the mole path. The spindle of the figure four should be set close down to the trail, so that the little animal in passing under it will spring the trap.

How to Trap Insects.—After sunset, place among the fruit trees an old barrel, the inside of which has been well tarred. At the bottom of the barrel place a lighted lamp. Insects of many kinds, attracted by the light, make for the lamp, and while circling around it strike against the sides of the barrel, where, meeting with the tar, their wings and legs become so clogged that they fall helpless to the bottom. A few cents' worth of tar employed in this way will, without any further trouble, be the means of destroying innumerable numbers of these insects.

PRESERVING THE SKINS OF ANIMALS.

Damaging Skins.—When a wild fur bearing animal has been captured in one of the cold months of the year, the hide should be removed with extreme care, for its value will depend in part upon the manner in which it is taken off. A cut here and there will, perhaps, render an otherwise valuable skin almost worthless. If the animal is allowed to lie too long, the skin will become tainted. Visit the trap often.

How to Take Off a Skin.—Experienced trappers and fur dealers recommend cutting the skin around the hind feet, and then slitting the skin down inside the hind legs to the body, joining the two slits between the hind legs; then remove the skin on the tail by pushing up the thumb nail, or a thin, flat piece of wood against the bone of the tail, and draw off the skin.

Now commence to draw the body of the animal through the slit already made, without enlarging it, drawing the skin over itself, the fur side within; when the forefeet are reached, cut the skin away from them at the wrists, and then skin over the head until the mouth is reached, when the skin should be finally removed at the lips.

Stretching and Drying Skins.—One thing to be borne in mind when stretching a skin to dry, is, that it must be drawn tight. Another, that it must be stretched in a place where neither the heat of a fire or the sun will reach it, and it should not be washed. Large skins may be nailed upon the inside of a shed or barn, but small ones are better for being dried upon a board, bow or hoop stretcher.

The Board Stretcher.—This should be made of some thin material. The following mode of manufacture is taken from *The Trapper's Guide*:

“Prepare a board of bass-wood or other light material, two feet three inches long, three inches and a half wide at one end, and two inches and an eighth at the other, and three-eighths of an inch thick. Chamfer it from the center to the sides almost to an edge. Round and chamfer the small end about an inch upon the sides.

“Split this board through the center with a knife or saw. Finally, prepare a wedge of the same length and thickness, one inch wide at the large end, and tapering to three-eighths of an inch at the small end, to be driven between the halves of the board. This is a stretcher suitable for a mink or a marten.

“Two large sizes, with similar proportions, are required for the larger animals.

“The largest size, suitable for the full-grown otter or wolf, should be five feet and a half long, seven inches wide at the large end when fully spread by the wedge, and six inches at the small end. An intermediate size is required for the fisher, raccoon, fox and some other animals, the proportions of which can be easily figured out.

"These stretchers require that the skin of the animal should not be ripped through the belly, but should be stripped off whole. Peel the skin from the body by drawing it over itself, leaving the fur side inward. In this condition the skin should be drawn on to the split board (with the back on one side and the belly on the other) to its utmost length, and fastened with tacks or by notches cut in the edge of the board, and then the wedge should be driven between the two halves.

"Finally, make all fast by a tack at the root of the tail, and another on the opposite side. The skin is then stretched to its utmost capacity, as a boot leg is stretched by the shoemaker's "tree," and it may be hung away in the proper place, by a hole in one end of the stretcher, and left to dry.

"A modification of this kind of stretcher, often used in curing the skins of the muskrat and other small animals, is a simple board, without split or wedge, three-sixteenths of an inch thick, twenty inches long, six inches wide at the large end, and tapering to five and a half inches at six inches from the small end, chamfered and rounded as in the other cases.

"The animal should be skinned as before directed, and the skin drawn tightly on to the board, and fastened with about four tacks. Some trappers use wide, smooth pine shingles for stretchers.

The Bow Stretcher.—"The most common way of treating the muskrat is to cut off its feet with a hatchet, and rip with a knife from between the two teeth in the lower jaw, down the belly, about two inches below where the fore-legs come out. Then the skin is started by cutting around the lips, eyes and ears, and is stripped over the body, with the fur side inward.

"Finally, a stick of birch, water-beech, iron wood, hickory or elm, an inch in diameter at the butt, and three feet and a half long, is bent into the shape of an ox-bow and shoved into the skin, which is drawn tight, and fastened by splitting down a sliver in the bow, and drawing the skin of the lip into it.

"This method is too common to be easily abolished, and is tolerable when circumstances make it necessary; but the former method of stretching by a tapering board, in the case of muskrats as well as other small animals, is much the best.

"Skins treated in that way keep their proper shape, and pack better than those stretched on bows, and in the long run boards are more economical than bows, as a set of them can be used many times, and will last several years; whereas bows are seldom used more than once, being generally broken in taking out.

The Hoop Stretcher.—"The skins of large animals, such as the beaver and the bear, are best dried by spreading them, at full size, in a hoop. For this purpose a stick of hickory or other flexible wood should be cut, long enough to entirely surround the skin when bent. (If a single stick long enough is not at hand, two smaller ones can be spliced together.) The ends should be brought around, lapped and tied with a string or a withe of bark.

"The skin should be taken from the animal by ripping from the lower front teeth to the vent, and peeling around the lips, eyes and ears, but without ripping up the legs.

"It should then be placed inside the hoop and fastened at opposite sides, with twine or bark, till all loose parts are taken up, and the whole stretched so that it is nearly round and as tight as a drum head. When it is dry, it may be taken from the hoop, and is ready for packing and transportation.

"This is the proper method of treating the skin of the deer. Some prefer it for the wolf and raccoon. In many cases the trapper may take his choice between the hoop and the board method. One or the other of these methods will be found satisfactory for curing all kinds of skin."

Tanning Skins for Home Use.—I know of no more cheap and simple process than to apply to the flesh side when fresh and wet, a mixture of two parts saltpeter and one part alum. These should be finely pulverized and sprinkled over every part of the skin; double in flesh to flesh, roll up and let it lie a day or two; then with a dull knife remove the meat and fat, if any has been left.

After about half dry, commence rubbing and continue working until dry. The skin will be found very nice, white and pliable, and the hair firmly set.

Another Mode.—Remove the flesh and fat, then wash the skin in a solution made by dissolving a little sal soda in the water. Take four ounces pulverized alum, eight ounces salt, one quart new milk to four gallons soft water, also one pint prepared starch; stir well; put in furs, and air them often, by hanging them over a stick laid across your tan tub, so that they will drain back in the tub. Handle occasionally, until they have been in the solution a day or two, then add to the liquor, first removing the skins, half a teacupful of sulphuric acid; stir well and put back the skins, keeping them stirring pretty often for an hour, then take out, wring and rinse in soft, lukewarm water; hang up in a cool place, and, when they begin to get white, work and stretch them till they are dry. Hides of large animals should remain in the solution longer.

Skinning Animals for Stuffing.—When it is the intention to stuff the skin of an animal, the process of removing the hide is considerably varied. From a foreign periodical, I have obtained some good directions:

Lay the animal on its back, and plug up its nostrils, mouth and wounds, if any, with cotton or tow, to prevent the blood from disfiguring the skin. A longitudinal incision is then made in the lower part of the belly, in front of the pelvis or thigh bones, and extended thence to the stomach, or higher if necessary, keeping straight if possible.

In this operation the hairs must be carefully separated to the right and left and as few cut as possible. The skin should be turned back to the right and

left, putting pads of cotton or tow between it and the muscles, as you proceed in skinning.

If any oily matter should make its appearance on the skin it must be wiped away. Now remove the skin in every direction as far as the incision will admit of it. Each of the thighs must be separated at its junction with the pelvis, that is, by the head or ball of the thigh bone.

The intestinal canal is next cut across a little way above the anus, and the tail is separated as close to the animal as possible. After this, the pelvis is pulled out of the skin and the skin separated from the back, with the handle of the scalpel passed between it and the carcass.

It is pulled gradually upward until the operator reaches the shoulders. The whole hinder parts and trunk of the body being thus out of the skin, the next operation is to remove the fore legs, by separating them from the body at the shoulder joint.

When the joint of one shoulder has been separated from the body, the leg is again put into the skin, and the animal turned, in order to repeat the same with the other side, the limb of which is also returned. The skin is then removed from the neck.

The next thing is to separate the skin from the head. By the assistance of the knife, it is taken off as far as the nose; while great care must be taken not to injure the eyelids, and to cut the ears as close to the skull as possible; and also to avoid cutting the lips too close.

All this having been performed, the head and trunk are separated from the skin. The next operation is to remove the head from the trunk at the upper bone of the vertebræ or spinal column. The external muscles of the head and face are then cut off, and the bones left as free from flesh as possible.

The occipital bones are next opened with a strong knife, and the brain all carefully removed. The fore legs are now pulled out of the skin, by pulling the legs one way and the skin another, as far as the claws of the foot. All the muscles are then cut off the bones, while care is taken not to injure the ligaments and tendons. They should be left adhering to the knee. They are then returned into the skin again.

The hind legs are then treated in like manner. The tail is the last part skinned, and this is a more difficult task than the other parts of the body. Two or three of the first joints of the tail-bone are first laid bare by pulling the skin back. They are then tied with a strong cord, which must be attached to a strong nail or hook on the wall.

A split stick is then put on the tail-bone and forced to the extremity, and the tail-bones come out of their enveloping skin. The skeleton head having been divested of all its fleshy matter, tongue, palate, external muscles, and brain, is now returned to its place in the skin, which is in a condition for commencing the operation of stuffing.

Stuffing Animals.—After the hide has been properly fitted, stuff with hemp, flax, hair, or any soft material that will pack closely. Short grass, called rowen, cut and thoroughly dried, will do for large animals. The lint made by scraping a hemp rope with a knife will provide excellent material for small animals. Begin stuffing at the extremes, and crowd in until each part assumes a natural shape. The eyes will have to be purchased. They may be held in place by putty crowded into the socket of the skull.

Skinning Large Animals.—A worker in a tannery says most of the hides that come to his establishment show awkwardness in the style of removal. To do it right, abandon the old method of cutting down the inside of the leg, he says, and proceed as follows: Place the dead animal on its back, then the operator, by thrusting his knife point foremost and edge up, makes a slit the entire length of the carcass, from the chin over the center of the breast, in the line of the navel to the tail. Let him now stand by its side, with his face looking the way the head lies, and taking the forefoot in his left hand, run the point of his knife in the line of the cleft of the foot and cap of the knee, up the front of the leg and into the central slit of the bosom.

For the hind leg, having reversed his position, let the slit be made in the line of the heel, over the center of the cap of the hock, down the back of the ham, into the central slit. In this way the hide when spread out will have a square form without long projections, and consequent deep indentations of its outline.

Tanning Skins for Lashes.—The most simple and economical method is the alum tanning. First rid the skin of all fat and flesh, then bury it well spread out in wet ashes or soft soap, until the hair starts readily, which will be in a day or two. Remove all of the hair, soak and wash thoroughly, then put it into the tanning solution, which may be made by dissolving a good, large handful of pulverized alum, and one or two handfuls of common salt in three or four quarts of water. Leave in the solution for twelve to fifteen days, rinse thoroughly and pull, rub and stretch while drying. The leather will be very soft. Skins tanned in this way make good whip lashes, and flail and other strings so long as kept dry. There is no process for making leather equal to that of the regular bark tanning mode, and all large hides or skins should be thus treated.

Tanning Buckskin.—Buckskin is tanned by the Indians, by use of animals' brains. After removing the hair the skin is immersed in brains and water, heated to about one hundred degrees, and whipped into a lather.

The *Trader* says that in order to ascertain when the skin is properly "brained," it is gathered up into the form of a sack and inflated; then by closing the orifice, and pressing upon the sack, the inclosed air will be caused to pass out through innumerable pores, making a spray from the particles of contained water.

Wring out all the water possible, and stretch and rub vigorously while dry-

ing, when it will become white and soft. If the skin be now wetted and suffered to dry without manipulation, it becomes hard again like a raw hide. Smoking is a means of obviating this.

The object is to make the smoke pass through the pores of the skin. The effect of the braining seems to be to comminute the gelatine, but it does not affect its solubility.

The smoke seems to form a chemical combination with it, rendering it insoluble. A hole is dug in the ground about two feet and six inches in diameter. Some coals are thrown in and a little wood upon them. The skins—better two together—are loosely sewed along the edges, except one, which is stretched around the hole, and the skins are then suspended above it, much like an empty sack, with the mouth downward. The smoke in its ascent fills the sack and passes through or penetrates its substance.

The process is kept up till the operator deems the skin sufficiently smoked. Now if they are wetted they dry soft without manipulation. There is still another operation which improves them, though not necessary. It is a species of tanning. Willow bark, or that of the sassafras, is good, as it does not stain clothing when the skin is wet, as it would if tanned with the ooze of oak.

Boil a small quantity of bark and dip the skins into the ooze for a few minutes; wring them as dry as possible, and the operation is finished. Treated in this way, the skins have a wiry texture. In its original state a skin of ordinary size is easily torn into strips.

When dressed, the fibers, being loose, come gradually into parallelism, and the tension is resisted by many at once. Previously held to its place by the gelatine, each fiber, acting singly, was readily broken.

Sometimes the smoking is done by setting sticks up around the hole, the ends coming together over the center of the pit. The skin is laid over this frame work, and thoroughly smoked for an hour or two, then rubbed with gypsum or chalk, then whipped and stretched.

Tanning Mole Skins.—Take the hide and draw it over a medium sized corn cob, and place it in the sun. Then apply sweet oil to it once every twenty-four hours to prevent the hide from getting dry. After giving the hide about five applications of this oil, take a little fine alum and rub the hide with it thoroughly. By this time the skin is perfectly tanned.

Tanning Sheep Skins, Wool On.—Sheep skins may be nicely tanned with wool on, to be used for carriage or door mats, by a process very similar to that of tanning furs. First, wash the pelt in warm soap suds until the wool is thoroughly cleansed, rinse well and soak for one day in a solution of alum and salt, equal parts in water, say eight ounces of each in sufficient warm water to cover the pelt. Drain well, stretch on a board and when half dried sprinkle the flesh side with equal parts of finely pulverized alum and saltpeter; fold together and let it so remain, in doors, for a few days, turning the pelt over once or

twice a day, so as to get the solution equally upon each part. When well dried, dress off and rub well with pumice stone, which will render the hide very soft and white. Trim the edges to please the taste.

Tanning Skins for Furs.—Take soft water about ten gallons, one-half bushel wheat bran, seven pounds sulphuric acid. Dissolve all together and put the skins in the solution, and allow them to remain twelve hours; take them out and clean them well, and again immerse twelve hours, or longer, if necessary. The skins may then be taken out, well washed and dried. They can be beaten soft, if desired.

Preserving Stuffed Animals.—Rub the flesh side of the skin with a composition of one pound of tobacco ashes, one half pound of alum, two pounds of dry slaked lime.

SKINNING AND STUFFING BIRDS.

Preparing a Bird for Skinning.—In this connection, I cannot do better than to give the simple and very effectual method of W. B. Tegetmeier:

The bird whose skin is to be preserved should, if the season and climate permit, be allowed to become cold, as it is then more easily handled, being rigid, and the blood is less liable to soil the plumage.

The first thing to be done is to plug up the throat and nostrils with cotton wool, to prevent the escape of mucous or any fluid during the turning of the bird in skinning. This should be done carefully, a lock of cotton being thrust quite through the nostrils with a pair of sharp dissecting forceps or some other blunt pointed instrument.

If the eyeballs are broken, they should be plugged also; and, even if that is not the case, it is desirable to wipe the eyes out carefully under the lids, to prevent any adhesive moisture soiling the feathers. This is most conveniently done by a lock of cotton wool held by the forceps. Every shot hole must be plugged to prevent the escape of blood.

How to Skin a Bird.—The specimen is now to be placed on the back with the head turned toward the operator. The wings are to spread out flatly on the table, and the first bone of the wing on each side (the humerus) broken by a blow from the small end of the hammer, or by pressure with a pair of strong pincers. This should be done without wounding the skin or injuring the plumage. The feathers on the breast are next to be separated, so as to expose the skin along the keel of the sternum from the chest to the vent.

Thrusting the sharp point of a pair of scissors under the skin at the front of the breast bone, an incision is made along the middle line right down to the vent. No advantage—but, on the other hand, considerable inconvenience—

arises from making it too short. The fingers should now be introduced, and allowed to play around the body, separating as far as possible the skin from the chest, back and sides, and freeing the bases of the wings and thighs.

If the flesh of the bird is intended for food, which may often be a necessity with a wandering naturalist, soft folded paper should be introduced under the skin as it is loosened, to prevent it adhering to the flesh from which it has been separated, and to save the feathers from contact with the moisture of the body.

Should the flesh not be required for food, the employment of some dry absorbent powder is more convenient than the use of paper. One of the best powders for this purpose is dry, fine mahogany sawdust; but the fine sawdust of any hard wood may be used, or plaster of Paris may be employed; but the use of flour, or any material that becomes adhesive when moist, must be avoided.

The next stage is to raise the bird up on the vent, the tail and back being turned toward the operator; in this position the skin is loosened and thrust away from around the roots of the wings and the base of the neck, which are thus isolated. The neck is then separated by cutting through it with a strong pair of scissors at a few joints from the body, and the wings are cut off where the bones had been previously broken.

The upper part of the body is now free, and the skin should be *pushed* back along the sacrum, thighs and legs toward the tail. This process should be carefully performed, for if the skin be pulled instead of pushed off, it is stretched to so great an extent that its value is greatly lessened, and it is also liable to be torn.

In removing the flesh from the legs one of two methods may be followed—the tendons close to the top of the shank (tarsus) may be cut across with scissors, and by then running the blade up the bones of the leg (tibia and fibula) the flesh may be pushed up in one piece, so as to leave the bones quite clear, when they may be cut off immediately below the knee; or, if preferred, the bones may be cut across below the knee, thrust out through the flesh, which may then be separated from the bones, working downward toward the shank.

All that now remains to be done is to skin round the root of the tail, removing as much of the soft parts as possible, and finally the skin is entirely separated from the body by cutting around the vent.

We have now to turn our attention to the head and wings. The skull and upper part of the neck is to be thrust back through the loosened skin of the neck. On arriving at the ears some care is requisite, for if the orifice in the skin be cut and enlarged much disfigurement results. In removing the skin from this part of the skull the edge of the knife should be turned toward the bone, and the skin, as it were, dug out of the ear hole.

In the same manner care must be taken not to enlarge the opening of the

eyelids, nor to pierce the eyeball in skinning over it. Having skinned forward to the gape or angle of the mouth, the back part of the skull should now be cut away, the neck bones and tongue removed together, and the brain scooped out.

The knife should now be passed around the eyeballs, so as to loosen their attachments, when they may be scooped out with the handle of the scalpel; and by the cutting away of the palate and fleshy parts of the head with a pair of scissors, that part of the animal is finished.

In the case of ducks, flamingoes and other birds with large heads and long, slender necks, it is impossible to pass the head backward through the neck. In these cases a cut should be made along under the side of the neck, near the head, which should be passed through the opening and cleaned from the flesh as before described.

The wings still require attention. Turning the skin on the back, with the under side of the wings upward, an incision should be made along the fleshy part of the joint (along the ulna and radius). The flesh should be carefully dissected away from these two bones, but the secondary quills should on no account be loosened from their firm attachment to the bone; if this is done, the regularity of their arrangement can never be restored, and, as they form the most prominent part of the folded wing, the beauty of the specimen is irreparably injured. The skin, being now entirely removed from the soft parts, may be trimmed up, and any adhering portions of flesh removed from the bones, etc., which should be dressed with any preservative that may be used.

Cotton wool should be placed in the orbits, and the skin dressed carefully on all parts of the inside. The head should then be returned to its proper position, by carefully pushing it down the inverted skin of the neck. It is desirable to place a stitch across the back, so as to loop up the loose skin and prevent the wings falling too far asunder. This is done by taking a stitch in the skin at the base of each wing (inside the skin), drawing the parts somewhat together, and tying the threads.

How to Stuff a Bird Skin.—All that remains now is to fill out the specimen with cotton, wool or tow, to prevent the skin shriveling as it dries. The neck is most easily filled by a pair of long tongs, with scissor-like handles; these may be bought ready made, but a pair of common goffering tongs, if flattened at the tips, answers every purpose for birds of moderate or even for quite large size.

After wrapping a little wool round the bones of the legs and filling out the skin, it should be loosely pinned up in paper until dry and set, any accidental cut or large wound being previously sewn up from the inside.

The setting of the skin takes some days in the case of a large bird, during which time it should be looked at at intervals, so as to prevent any of the feathers drying in a deranged position, which would entail much trouble when the skin came to be permanently mounted.

To Mount a Stuffed Bird.—If it be a dried skin it must be steamed on the flesh side till flexible, taking care not to wet the plumage. Then form the body of tow, tied into shape by thread.

Double a piece of fine wire and twist the doubled part of it to a length sufficient for the neck, and passing the two ends on each side of the body, twist them firmly together just under where the tail will come, and leave their ends projecting to support the tail.

Fill the skull with putty, and lap tow round the twisted wire to form the neck, also round bones of legs and wings to replace the flesh removed. Put the tow body into the skin, sticking the end of the twisted wire into the putty to support the head, and if all seems right, sew up the skin. Then run pointed wires up the hollow part of the bones of the legs and through the body, clinching them in the tow on the other side. Then set up the bird, putting it in the desired attitude, and supporting the wings by pins or wires till the skin dries, when they may be removed; stick the eyes into the putty. Put the wings and feathers into shape, and then bind the bird with thread and keep it so two weeks.

Preserving Bird Skins.—To preserve the skins, dress with two parts powdered arsenic, one burnt alum, and one cayenne pepper; or use a pound of yellow soap mixed with one ounce each of lime, alum and camphor gum. The soap will give a permanent elasticity to the skin, and enable it to be set up at any future time.

A different compound for preserving the skins, is given by another professional taxidermist, which is as follows: Dissolve ten ounces best white soap in warm water. To this, add one ounce of potash, and then thicken with pipe clay and lime mixed. Heat thoroughly, and when cooling, add ten ounces of arsenic. By keeping the proportions, any quantity of the compound may be prepared.

It is not advisable for a boy to attempt to make the mixture, for any druggist will do it if given the formula. The mixture should be used with care, and the vessel holding it labeled "poison."

Killing Birds for Stuffing.—In killing birds to be stuffed and mounted, care should be taken to mangle to the least possible degree. For small birds, the line snare shown on page 298 may be used in some instances. In no case should the rifle be used, unless it is to secure very large specimens of extremely shy birds—those that will keep out of the reach of shot. Commonly, very fine shot should be employed, and the fewer in number of these that bring down the game, the better. Birds of the partridge family may be captured by traps, but tree nesting birds will require a gun.

THE MECHANICAL FARMER.

Farmers in general have not yet fully awakened to the importance of a more liberal use of mechanical tools at home. Every farmer brings them into use more or less, but not one-half of the land tillers use the saw, plane and hammer one-tenth part of what might be made profitable.

The chief hindrance to mechanical employment upon the farm, I believe to be attributable to the neglect of obtaining aids, or in other words, of procuring tools; but few farmers have even a decent saw or hammer upon their premises, and it is very seldom that we find what might be called a good set of bench tools, and in many neighborhoods it would be difficult to make up a set by bringing the entire lot together.

The husbandman who depends upon borrowing is always in trouble, besides which, the time spent in going for and returning tools, with the money spent in replacing damaged ones, would amount in a single year to enough to procure a tolerably good set at least.

It is just as essential that the farmer should understand the principles of mechanism as it is that he should be posted in the principles of stock raising and grain growing, or any other department intimately connected with his avocation. He should know when his mowing machine, hay rake, plow, or other implements are not properly adjusted, and be able to apply the remedy, and to be well enough posted to prevent being cheated when purchasing these utensils.

Every husbandman should fit up a workshop either in his house or barn, if not able to build a place for the purpose, and get a kit for the bench just as soon as his circumstances will admit of it; then a tool will be at hand when wanted, and nearly all the repairs upon farm implements and buildings may be done without going to the expense of employing a professional mechanic.

There are horse rakes, hay and wood racks, sleds, wagon boxes, harrows, field rollers, etc., which may be kept in good order at the home workshop, and innumerable improvements made around the farm buildings.

There are feeding racks to make, grain troughs to construct, barn doors to fix up by rehanging or relatching, stanchions to build or improve, weather boarding to be put on, and roofs to mend, besides scores of little necessities which may be provided at the house for the convenience of the women folks. Every housewife who has a husband or son familiar with the use of mechanical tools will give her testimony in favor of the farm workshop.

Any man, of even ordinary ability, will be surprised, after a few few years of handling tools, to find how much he is capable of doing. If he is a man in the habit of doing his work well, he will also have the satisfaction of knowing that he has saved himself a round bill at the village shop; one which many farmers often find it very hard to pay, and which is many times unjustly large.

A man cannot be called shrewd who goes one or two miles to have a new whippetree made, when he could work it out himself in the time he was going to the shop, to say nothing of having to pay for it besides.

There is nothing more provoking, when work is pressing, than to find implements out of order. A day's delay at planting time, going away for repairs, will sometimes be of greater damage to the farmer than the expense of a new plow.

Care of Implements and Tools.—Do not hang the scythe up in the barn, shed, or any other place, attached to the snath, for many accidents occur every season to children or animals, knocking them down. Separated, they are much easier stored and much less dangerous.

Wagons, racks, forks, rakes, etc., should all be in good order before the haying is begun. As soon as grass gets into the proper condition, it should be gathered in just as early as possible, for when allowed to ripen before cutting a great portion of the nutriment is lost.

Any delays made to repair harvesting tools not only subjects the farmer to loss of money by hindering the field hands, but subjects him to loss by prolonging the time of garnering his crops. If any part of the wagon is weak, or any of the small tools out of order, thoroughly repair them before going into the meadow to work.

I do not advocate the too common theory that if a farmer prospers he must be a drudge, and the earnest appeal here made to fit up a workshop, is not for the purpose of providing a way to labor every hour of the week, but as a matter of convenience and profit. A thorough-going man does not like to be idle, nor yet does he prefer anything that pertains to servitude. It is free, voluntary action in any pursuit that makes men contented, and industry and economy that makes them wealthy.

The farmer who leaves his mower in the field, or backs it under a shed where it can be reached by driving storms, will have to buy a new one twice as often as a careful manager, incurring heavy expenses, when but a few hours' time at most is required to fit up and put it away in a proper manner.

A coating of three parts lard and one part resin, applied to farm tools of iron or steel, will effectually prevent rust. This or some other preparation should be applied to iron or steel implements when they are put away. See that they are dry and wiped clean before oiling.

The irons upon machinery where there has been friction are bright, and the grease upon them is soft, which can be easily removed. Wipe the journals and boxes clean with a cloth moistened in spirits of turpentine or coal oil, and

then rub them over with an oiled rag. Take off the cutter-bar, wipe clean and oil the sections and guards, then put them safely away where they will be free from exposure to moisture, for if they are allowed to get rusty, they will never work as nicely as before.

If the machine needs painting, give it a coat or two before it is laid up for the season. No color that can be obtained at a moderate expense is nicer for this purpose than American vermilion.

Lay Up the Pieces.—Any farmer who does not practice saving pieces would be surprised at the real profit derived by laying up the odds and ends about his premises. Every day, almost, there are bits thrown away, at the time considered of no value, which, perhaps not many days subsequent, would save both time and money.

How many times a year does a farmer want a strip of board, a piece of hickory timber, something for a hammer handle or rake tooth, which cannot be obtained without spoiling valuable material, or going to some carpenter shop? and perhaps while this delay is made, a team and hired man are standing still waiting for a broken tool to be put in order.

But very little time would be required while working at the wood pile to sort out and split into proper shape bits of tough timber and lay them up in some out of the way corner, and also to throw up small pieces of boards, such as are usually used for making kindling wood.

A strip of board not more than two inches wide may be wanted some time in a hurry, for a cleat upon a wagon box, or some other size for another purpose, and the saw has to be applied to the whole board to obtain it.

The repairs upon buildings, making board fences, splitting stakes or stove wood, always makes pieces in just about the shape that will be wanted at some future time, and they should never be wasted. These fragments possess of themselves no real value at the time of laying them away, but their worth is in supplying a want, and saving hindrance and perplexity in a busy time.

It is just as essential to save pieces of leather, scraps of iron, screws, nails, bolts, hinges, wire, buckles, rings and rivets. Any amount of this material is cast away annually, or sold for one cent per pound, when, if saved, would have been worth dollars, perhaps.

By this I do not intend to advocate that when a breakage occurs upon any farm implement, that patching up will answer for permanent repairs, for all tools should be kept in the best of order, but there are times when plowing, harrowing, or at some other work, that the harness or some implement will give out, and by the aid of wire, leather, nails, buckle or a piece of tough timber, the breach may be quickly repaired, and with sufficient strength to last until the hurry is over and time can be spared to take the implement to a workshop.

A stitching awl and a few waxed ends kept on hand will often save a hundred times their cost.

FARM RESIDENCES.

Selecting a Farm House.—When purchasing a farm, the residence upon it, if not to be replaced by another, should be an important consideration. The building should not be over large, nor should it be contracted in its apartment room. If possible obtain one with a good hall, the principal room opening from it; rooms interfering with others are a great annoyance to house-keepers, as it is impossible to keep a room tidy when used as a thoroughfare by members of the family, without frequent use of broom and duster, which is a constant wear on carpet and patience.

The dining room ought to open either out of the kitchen or be separated by a hall; each should have a closet opening from it, and the kitchen have a passage to the cellar and an outside door.

The parlor is most pleasant facing the south, and should be independent of the rest of the house. The nursery is the most convenient on the principal floor. Small bedrooms are preferable with closets to large ones without. Spring or well and rain water should be near the kitchen. Furniture which appears well in small rooms, would hardly be called respectable in large ones. Simple plans for building will be found on page 39.

Designing a Farm House.—Seldom is it that a house is so perfectly built by any man but that great changes and improvements could be made afterward, but to make the desired alterations in the construction of a building is by no means an easy matter, and it is, therefore, very important, when laying plans for a house, to study closely by diagram different designs, and to visit and to closely examine such buildings within reach as are the nearest perfect in arrangement.

People differ, of course, in their tastes, and what would satisfy one would not do at all for another; so when building a home, the counsel of no outsider should be entirely followed, but the family to occupy the house should arrange those things which they alone are to enjoy.

I am aware that a wrong system of rural architecture has prevailed quite too long in almost every section of the country. Great, overgrown, two-story farm houses are scattered far and near, and the reason there has been adopted no higher system of architecture, is simply because one man copies too much after another. To-day, we see hundreds of houses with exteriors, and no doubt interiors, in exact imitation of the "old New England home." The structures already made are, many of them, expensive, and will probably stand as they are until they fall into decay by the slow hand of time.

Farm House Cellar.—When building a farm residence, by all means have a good cellar. If one is not provided, it will always be regretted. Where the location is such that it will admit of it, have the cellar below ground, and

the proper place is under the kitchen. Build up strong frost and rat proof walls, with windows so constructed that ventilation may be given at will. If economy is sought when building, rather let the chambers for the present go unfinished than give up making a cellar.

Stoop or Piazza.—No one can more fully enjoy a shady resting place at the house in the summer than the farmer. The expense of a stoop or piazza is not great, and the comfort to be derived is highly remunerative.

Good Water Storage.—It is very strange that so many farmers who have comfortable dwellings, and ample conveniences for carrying on farm work, should neglect to build cisterns, and depend upon barrels, tubs, etc., for saving rain water.

While you have hands in your employ for excavating, and masons to build walls, attend to the cistern. This by no means should be neglected, for it may be built at about one-half the expense now that will be required when preparing expressly for it. Build the cistern large, to hold not less than forty barrels, and have it situated so that it may be easily reached from the kitchen by means of a pump.

If there is any one convenience provided for the housewife which awakens in her a sense of pride more than another, it is a cistern full of nice, soft water. A good housekeeper loves cleanliness; in this she prides herself, and is sadly disappointed and irritated if she is deprived of the important requisite. I believe there is more vieing going on connected with the appearance of "Monday's washing" than in any other department of domestic employment.

A good location for a cistern is back of the side wing; water is then convenient to the kitchen stoop, where washing in summer may be done.

Foundations for Farm Houses.—There is no practice more reprehensible than that of erecting new work on old, and yet this is constantly done. It cannot but be evident to every thinking mind that the old wall which was originally erected on a foundation suitable to its weight, would not be capable of sustaining an extra burden, such as a new addition would impose upon it; and that the old foundations must necessarily prove quite inadequate to the task and give way under the new pressure, so much greater than that for which they were originally constructed.

Economy is the cause of this, as of other injurious practices in building. A desire to stretch one's means leads to trusting a poor foundation; and the same desire induces those who erect additional superstructure to trust still more on that foundation. Hence we have settlements which destroy the level of our doors and windows, crack our ceilings, and split our walls.

These evidences of dilapidation are covered up most carefully. The windows and door frames are renewed or reset, the ceilings are tastefully papered over, and the walls tuckered and pointed, and most probably the whole of the brick front, if the house is brick, is painted and penciled in imitation courses, to give

appearance of a perfect wall. All these things are done to deceive others into security, and induce them to purchase and trust their lives and property in a most treacherous trap.

The foundation is at the bottom of everything. If it is not a good one, it must receive the first and best attention. If you wish a good cellar, the foundation must be of stone, and built up in the shape of a wall, inclosing the cellar. The excavation must be made below the reach of frost, and if good, solid earth is reached, the walls may be started from that.

Bedroom Doors and Windows.—Generally, when building a new house, the doors and windows are put into the bedrooms after a set mechanical plan, and four times out of five, when the bed is placed in the room, it is found that there is no good location for it. It either has to head up against a window, crosses a door, or located so that access to the closet is made inconvenient.

When laying out these most important rooms, first provide for the bed, and make all else conform to that. The relative position of bed and window should be such that in ventilating, a current of air will not cross the sleeper. As one-third of the whole human life is spent in the bedroom, this apartment should receive careful consideration.

HOUSES OF PLANK.

Plank Wall Cottages.—Very cheap and durable cottages may be made of planks, where timber is abundant and a saw mill handy. *The Manufacturer and Builder* says they are the strongest, most easy of construction, and most weather tight walls that can be built.

The planks are sawed any thickness, the best thickness being about two inches, and the widths three and a half and four, laid one upon another, flat sides down, each alternate plank a narrow one. Every other plank to project on the inside, and all to be flush on the outside. Thus the projecting courses on the inside will serve to hold the plastering, and the expense of lathing will be saved.

Constructing Plank Walls.—The work of construction is so very simple that any man, with a boy's help, can put up a neat, tidy, comfortable shell of a small cottage in a very short time. The plank, say two inches thick, can be handled with the greatest ease, being comparatively light. At the quoins or corners, they must lap each other at every second course, and these quoins must be well secured together with two iron spikes, previously dipped in linseed oil.

At every fourth course of plank, inch auger holes are to be made, at, say,

three feet distant from each other, all around the walls, and into these holes oak pins are to be driven ; and this operation must be performed so as to *break joint* all the way up. Where doors and windows occur, the frames will be inserted and the plank cut in accordance.

Plank Wall Partitions.—Partition walls can be made up in the same manner, using only the three inch planks, and projecting them alternately on each side, thus presenting the two surfaces prepared to receive the plastering. It would be advisable to let the planks of partitions into the main walls occasionally, so as to lock the work well and make all permanent.

These walls and partitions, it will be observed, offer no chance for rats or mice to establish themselves. Three good coats of economic paint, properly sanded, will give to the outside a very neat appearance ; and as the plank are laid on their sides, there is nothing to be dreaded from shrinkage.

Material for Plank Walls.—In the construction of such cottage walls, caution the constructor against using any plank that is sappy, or which has any symptom whatever of unsoundness ; as, when once set in the walls and driven tightly home, it will speedily generate rot, and infect the whole locality.

It would be well if while the builder is collecting the various other materials and preparing his foundation, the plank to be used in the wall were set out in the air, and a space left between each two planks to permit of the free action of the seasoning influence of the atmosphere.

No timbers are requisite in this mode of construction, as the tightly pinned together courses of plank are equivalent in themselves to solid timber.

Outside Finish of Plank Walls.—If the outer edges of the plank wall are planed, paint may be applied as a finish ; or the wall may be painted red, and striped to represent brick. Where two inch planks are used, a very good effect may be produced in this way. The striping should be over the cracks, and may be either white or black.

If one prefers, the wall may be clapboarded. This is really the only complete finish that can be given. By setting the window casings out on the surface, the building may be clapboarded any time after erection.

Location of Farm Buildings.—The first point to be considered in making permanent buildings for the farmer is location. They should be such as will be most accessible from every part of the premises. Much time and labor may be saved each day to the husbandman who chooses sites for his buildings with particular reference to the shape of his farm.

The location of a large stock barn should be chosen with particular reference to convenience, and not to accommodate particular fields, for fences may be moved easier than buildings. Never locate a barn "up in the meadow," so that an open field or long lane has to be passed through to reach it from the house, for it makes many miles of travel in the course of a year, and in some parts of the season, travel most disagreeable.

It is not uncommon to see a barn located twenty or thirty rods from the dwelling, with meadow upon all sides, save where the lane runs out to the pasture from the milking yard. The milk of the dairy, be it more or less, has to be carried night and morning this long distance through a path in the mowing lot, and in the summer time the gowns of the milkmaid get as wet from the dew upon the grass as if thrown into a mill pond.

The horses when coming in from the day's labor, either upon the farm or public highway, have to be taken up to the "big barn" to be turned out. The wood from the forest has to come by way of the lane, and then through the meadow to reach the house.

So it will be seen that farm buildings thus located are constant work producers, and the first thing I should advise farmers to do, when weather and time will permit, who have buildings located inconveniently, is to proceed to move them.

Bring all of the stock barns together and within reasonable distance of the dwelling, and so arrange them that all open into one yard. Then so plan your fields as to make them accessible, without having to go through a meadow or upon the highway.

Those who have been accustomed to put up with inconveniences all of their lives, do not realize the value there is in a well-ordered homestead, and how a simple and cheap rearrangement would add to both their wealth and comfort.

Now, while the subject is before you, look over your premises and see what may be done to benefit, and proceed to do it. The work will never be regretted.

FARM BARNs AND STABLES.

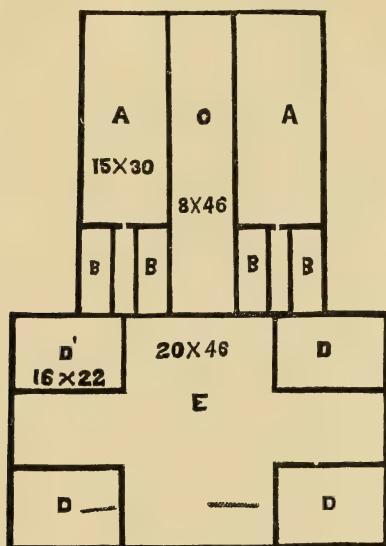
Size of Farm Barns.—The size that a barn should be built depends upon the magnitude of the farm, and the probable amount it will be required to store. The fact should ever be kept in mind, that it is much better to have a barn too large than too small. It adds but very little to the expense, to extend the posts up a foot or two, or to make the structure a few feet wider and larger than first calculated upon. Before building, one should visit the best farms in his vicinity, and examine the most approved plans.

I shall give in this volume but one diagram for the construction of a farm barn, for the plans and devices are so varied that it would make a large book of itself to give them all or even the so-called approved plans.

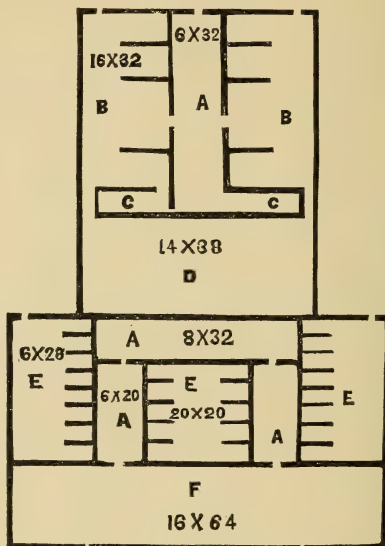
A correspondent and a first-class agriculturist has furnished the following, which he claims has given entire satisfaction ;

A, on common floor, represents grain mows or stables; B, granaries; C, pass way; D, mows for hay; E, barn floor. Between D D, at the ends of the barn floor, an embankment is built ten by eighteen feet on one side, and eighteen by forty on the other. Arched walls are used under the embankment for an ice house, root cellar, etc.

A, on basement floor, represents pass ways; B, horse stables; C, cribs or granaries; D, close shed; E, cow stables; F, open shed.



COMMON FLOOR OF BARN



BASEMENT OF BARN.

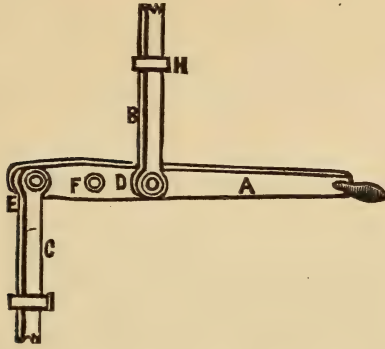
In the center of the horse stable there is a double stall, and a door from this into the passage way, A. The shed, D, is closed up at ends by large doors. E may be used for either cow or horse stable as desired.

The barn may be built without the basement stables at much less expense.

Construction of Barns.—Very good proportions for a common barn are twenty-four by thirty-six, thirty by forty, or thirty-four by forty-six. If one wishes to avoid the big beam, he can allow the purlin posts to extend up to the purlin plates, then have beams from the purlin posts to the plates. If these are of strong timber, well braced, there will be no danger of the barn spreading, and especially if the rafters are pinned at the lower ends to the plate, in the center to the purlin plates, and at the top to the ridge pole. There can be a small beam between the purlin posts just at their union with the purlin plates.

Barn Door Fastenings.—There have been scores of devices for fastening barn doors, but the old staple and hook and wooden latch still remain in

use. One simple device is given here, which may be made of hard wood by any one.



SIMPLE WOODEN DOOR FASTENER.

A represents a lever, to which are attached the arms or bolts, B and C, by a pin joint at D and E. The lever, A, works upon the pin, F, which is secured to the door. H and I are two guides or staples, attached to the door for the purpose of keeping the arms in place, as they move up and down by the action of the lever. It will be observed that by moving the handle of the lever up or down, the arms B and C will move correspondingly, so as to cause the arms to enter or be withdrawn from the staples, or holes for the arms above and below as the case may be, in fastening or unfastening the door.

Another fastening which works very well, and secures the doors at both top and bottom, is made of a three-eighth or half inch rod of iron, running the whole length of the door, up and down, and near the edge. It is held in place by staples driven over it into the arm pieces of the door. The staples are large enough so that the rod can turn easily in them. Before putting in the rod, have the ends bent so as to form hooks as semicircles, and bent outward at base of hooks, and a hand piece welded on at the center.



IRON ROD DOOR FASTENER.

Two pins of iron, same size of the rod, are to be driven at top and bottom of the door; one into the floor and the other into the timber over and just at the top of the door. Now, when the door is closed by a turn of the iron handle at the center bar, the rod is turned in the staples, so that the hooks set around the iron pins, and the door is held firmly in place. A little attachment to the hand piece enables one to manage it from the outside. The door (if double) overlapping the other by a cleat is the one to which to attach the rod.

To Fasten Barn Doors Open.—To fasten heavy barn doors open, when swinging out, or indeed for small ones, I have never found any device so effectual and convenient as a staple and hook. Fasten the hook to the side of the barn, and then drive the staple into the door at the proper place for making the connection. Even small hooks such as are for sale at hardware stores will answer every purpose, and the wire rings used in large picture frames will do for staples. Screwed into hard wood, they will stand heavy strain in case of high wind.

Mangers in Horse Stables.—Mangers are better than racks for feeding any animals, and I am glad that the old and injurious plan of compelling animals to haul their feed down from racks—which is contrary to all laws of nature and reason—is being rapidly done away with.

The manger in a horse stable should be situated at a convenient height for the horse to eat comfortably. I am opposed to the plan adopted by many of leaving a space between the manger and floor for storing bedding, for the reason that the strong odor which arises from straw soaked with urine is unhealthy for the horse to inhale; and further, being directly beneath the feeding manger, the hay will be more or less injured by it. Another objection is, the bedding, when packed in that manner, has no chance to dry.

Construction of Horse Stables.—On the construction of mangers a writer says: "After using for many years the following plan, I am satisfied it is superior to most arrangements, and excelled by none: A box or large tube, two and a half feet by two feet, and as high as the floor of the hay mow, is set up between two stalls in a small manger. The bottom of this box is two inches larger each way than the top, so as to prevent the hay from ever becoming wedged in or stuck.

"A semicircular opening, one foot in the highest place, is cut into the bottom of the box inside the manger. Inside this manger and on the opposite end, is placed the box to feed grain; if cut feed is used, the whole manger can be taken if necessary. The mangers should not exceed one foot in depth and two feet in width.

"Horses have no difficulty in drawing out the hay from the bottom of this box or tube, and at the same time will not waste a particle, as it is always a little easier to eat the scattering hay which falls than to draw out fresh hay. The hay is kept clean and sweet until eaten by the horses."

Horse Stable Litter.—The litter of the different stalls should be removed and spread upon the barn floor, or out of doors, if the weather will admit of it; but if there is no chance to do either of these, I should prefer to shake it up thoroughly and place it along the sides of the stalls as far back as possible, so that it may have a chance to dry out.

After the bedding has been removed, and floor made clean, some absorbent should be put on, such as spent tan-bark, chaff or sawdust; never use lime or

ashes, as they will be likely to injure the hair of the animal. Fresh, dry earth is one of the best materials to use for purifying and drying up stable floors.

Lighting a Horse Stable.—The stable should be so arranged, with regard to light, that a person on coming from without would experience no difficulty in observing objects within. It is not best to have a bright beam of light let in immediately upon the horse's eyes; but it should be a diffused and subdued light.

Ventilating a Horse Stable.—Ventilation should always have particular attention, and the conveniences for thorough ventilation so arranged that a current of air coming directly upon the horse may at any time be shut off. A horse put into a stall, coming heated from the road, with the chilling, wintry winds blowing in a strong current upon him, is very much in danger of taking cold and being stiffened up.

Earth Floors in Stables.—These are generally liked by those who have used them. They are certainly the natural foundation for a horse to lie upon. A further advantage is in having a ready absorbent for the liquid excrement. As clay is an excellent disinfectant it possesses a third advantage. A stable floor in general use never becomes thoroughly dry. It is not convenient to change planks, but the layer of clay may now and then be shoveled away and the bed renewed by fresh clay. It may be stored in the winter for that purpose.

Width of Horse Stalls.—Mr. Wilkinson, a practical stable builder, says that he has concluded that more than four feet nine inches in width in the clear, for a stall for horses of ordinary size, is not only unnecessary, but injurious, as in stalls of greater width than this the horse is liable to roll and get against the partition, and the animal injured. The partition should be so high at the manger end that it will render it impossible for the animals to get their noses together, and should be so strong that it will be impossible for a horse to kick them through.

Plank Stable Floors.—White pine makes a good floor. It should be two inches thick. It is best, if possible, to fill between the sleepers up to the floor with small stone or brick, and concrete it with lime mortar.

Horse Stall Drainage.—Wilkinson says: "I have two modes of arranging the floor for effecting drainage. One is to place a cast iron drip-grate, two feet by two and a half feet, in the proper position to receive the urine as it falls. This plate or grate is so laid that its upper surface is an inch lower than the margins of the floor of the stall, and when the floor planks are laid, the upper surface of them so laid that they will be level with the drip-grate on all sides, thus giving the oblique or slope toward the center of the stall about an inch on all sides.

"This not only secures the discharge of the urine into the drip-grate, by making the floor as I have described, but the feet of the animal are all on the same level, and when he lies with the back either way, the back is the highest—the position sought by the horse when at liberty.

"In the use of a line of stalls, the drip-grates are connected with each other by a tile pipe under the floor, and finally discharged by a conduit out of the stable. Where there is a single stall, of course the drainage is taken directly out of the stable. The cleanliness of this arrangement, and the great economy in the use of bedding, gives to all using the fullest satisfaction.

"The next best mode of arranging the floor is by keeping the side margins level from the front to rear, laying the long way of the plank crosswise of the stall, and laying them with a space of half an inch between the ends, which provides a slot half an inch in width and six and a half feet in length in the center of the stall.

"Under this slot I place a V shape iron urine drain, which discharges into a gutter under the floor behind the line of stalls, and is conducted out of the stable. The floor has the same advantage of a slope from side to center as that described above; but the drainage is not as efficient, though it is about five dollars a stall less expensive, though not nearly so durable or economical in the use of bedding."

Coal Tar for Stable Floor.—Another gentleman, in speaking of the merits of coal tar as compared with water lime for stable floors, says that a proper mixture of coal tar and fine gravel (or better, say coarse sand) is to all intents and purposes better than water lime, and fully as cheap, more durable, and can be more easily patched when broken; besides all this, it is an enemy to rats and other vermin, and in all respects more cleanly and less affected by the ammonia from the excrements. It will last longer and be of a more consistent and persistent solidity under cover, than when exposed to the sun's rays and the influence of storms.

Upper Floors of Stables.—Where hay is kept over the stable, the floor overhead should either be ceiled or a wall below the joist be made of lath and plaster. The gases arising from a stall continuously, during a winter, will so impregnate the unprotected material for food above, as to make it absolutely unfit for an animal to eat.

Gas Tar on Plank Flooring.—Where earth floors are not used, double planking, one and one-half inches thick, of white oak, saturated with hot gas tar and firmly spiked down, will keep dry. The incline should be sufficient to allow liquids to run off.

Cow Stable Floors.—Throughout the country not more than one barn in every ten can be found that contains a stable floor so constructed but that the cattle are compelled to lie in their own filth, and the sides, legs and udders of the cow are in a most untidy condition when the morning milking is done, and unless a great deal of washing and painstaking is practiced, the milk cannot be carried from the stable in its original purity.

Now but little work is required to remove the one great cause of discomfort to cattle in stalls, and the almost whole cause of having winter milk unpalata-

ble and impure. A platform should be built for the cows to stand upon, extending far enough back from the stanchions to give sufficient standing room, and no more. In this way a dry, clean place to lie upon is secured.

To Make Cow Stable Platforms.—There are different modes for making this platform. Where a new floor is being put in, a short part can be laid at the back and the balance laid at an elevation of two or three inches above ; the last, of course, overlapping the first.

On floors already laid, a good way is to spike down two by three scantling a little back of where the hind feet will come, and fill the space between this and the stanchion-sill with sawdust or dirt. This will make a good bed for the animals to rest upon, and it will also absorb all the moisture that may fall upon it. If dry sawdust, spent tan bark or dirt are put in, moisture will not be contracted in sufficient amount to injure the floor below, unless stock other than cows are kept upon it.

Another good way is to lay down three strips of inch boards, at each end and center, and upon these lay the platform of two inch plank, giving an elevation of three inches. Air will circulate between the two floors and prevent rot. It is not economy to nail one floor to another without space between.

The best way to find the exact spot at which the platform should terminate, is to go to the stable when the cows are in the stanchions and mark the distance which they require to stand upon. The object is to have the excrements drop upon the lower floor, leaving the platform clean and dry.

There should be an incline of at least two inches from the front of the stall to the back.

Earth for Cow Stables.—An agricultural correspondent writes me that his cow stable is built under a bank barn, is nine feet high and twenty-nine feet long, and is divided for the use of nine cows, which are fastened with upright stanchions secured by wooden catches. The cows stand upon an earthen platform secured in the rear by square timber ; the length of platform from stanchion to the outside of timber is five feet six inches.

A Manure Sledge.—Closely behind this earth platform is an unpatented invention of his own, consisting of a sledge thirty inches wide in three sections, made of strong oak boards ; the battens on the upper side and a three inch rim on the outside. In the end of each section nearest the door is attached a ring. The sledge being placed against the platform, leave a drop of about nine inches, and will retain the droppings for one week if necessary.

He hitches a horse to the ring, draws into the yard, and turns over with a spike, or by hitching the horse to a hook in the center of the rim, then draws into the stable to its place.

Beneath the sledges is a covered drain that discharges in the manure yard.

Boxes for Cow Feeding.—The rack or box for feeding in is directly in front of stanchions and is raised about three inches above the platform. In

feeding cows, the space in box is divided to prevent horning and reaching for feed. Adjoining, he has stables in which cows are chained in box stalls with trough and rack, and can daily see the contrast between these and stanchions. He thinks his stable economical, convenient and practical.

Timber for Stable Floors.—By some, objections are raised against the use of elm planks for cow stable floors, and the reasons assigned are that it retains moisture longer than other wood; that it will warp; that it rots out quickly, and that when wet it is very slippery.

The objections in the main are groundless, for in the first place, elm will not retain moisture longer than any other wood. It being more porous than some, receives water more freely, and yields it to the influences of evaporation just as readily. No stable floor used sixteen hours, at least, per day, is expected to become dry. As to the second objection, the whole depends upon the selection of timber. Common water, or white elm, will warp and is not profitable, but the chestnut elm, which is very similar in appearance, but firmer grained and harder, will not warp and is durable. This species grows upon higher and dryer soil than the water elm. I have used the chestnut elm scores of times for wagon boxes, and never found a better material.

As to the third objection, I have used elm for floors in both cow and horse stables for twenty years without replacing, and doubt if any timber will do better than this.

As to the last, elm does not become so slippery as most other kinds of wood. Any stable floor should be kept so well littered as to prevent slipping.

I do not wish to be understood as placing elm at the head of the list of timbers for stable floors, for I prefer either oak or pine, but when it is condemned entirely, I enter protest.

Stalls for Cattle.—Where but few horned cattle are kept, box stalls are much to be preferred to stanchions. Cattle will do better if they have liberty of motion than if confined in one position. Commonly, however, there is a desire to economize space, and stanchions are used; so a few hints will be given as to construction.

Material for Stanchions.—In obtaining lumber for making stanchions, it is best to get the material of different thicknesses. It will require three uprights to each cow, one each side of the neck, and one between each two animals. As one must be movable, it should be a little thinner than the other two. The movable upright should be one and one-fourth inches thick, the other two one and a half inches thick, and all six inches wide. It is a bad plan to use poles or small sticks between the stanchions, as the cattle are liable to get their heads into the wrong places.

Height of Stanchions.—The height of the stanchions should be about six feet from floor to top, and the distance between the center of the stalls—that is, space for each animal—thirty-six to forty inches. Lumber for uprights cuts to

good advantage when thirteen feet long. The side rails at bottom and top should be two inches thick and six inches wide. It is a very easy matter to lay out the work when the material is ready. It should be put together lying upon the stable floor, and then erected to place as a whole.

To Lay Out Cattle Stanchions.—In the first place, the side rails should be prepared of proper length, which is the entire length to be used for stabling. As it will generally be difficult to get sticks long enough to reach the whole length, they should be halved together at the ends, and firmly bolted with two and a half inch bolts. When all is ready, put down the rails for one side, and lay off the distances apart for the uprights; place them in position, and then lay on the other side rails, and stay them in place by clamps or a few large nails.

If thirty-six or thirty-eight inches is to be the space for each animal, lay out the work accordingly, and set the two neck rails each side of the mark three and a half inches, so as to leave a space of seven inches for the neck of the animal.

When all is in place, bore three-eighth holes through the top and bottom—save the top of the movable upright—and bolt firmly with six-inch bolts. The two neck uprights should be allowed to extend above the top beam, to be used as a stay for the locking cap. It is not absolutely necessary to use bolts on the upright between the stanchions. They may be pinned or fastened with spikes or twenty-penny nails. After setting the framework up, bring the movable upright to the proper place; then mark a bevel from one and a half inches on the outer edge to a lower point on the other edge; take it out and saw it off. Then it can be put back to remain.

The cap should be six inches wide, two feet long and an inch thick, and of good, tough wood. Cut a slot so that it will drop over the stationary upright; also one to receive the movable upright; then bevel the lower edge of the cap so that the two bevels coming together will raise it until the movable piece has reached the right place, then allow it to drop into a position which firmly secures it.

Adjusting Cattle Stanchions.—Sometimes the space of seven inches for the neck of the animal proves to be too wide, and it is a common custom to nail a board on the stationary upright, allowing it to project sufficiently to lessen the space an inch or two. There is a better plan than that. Bore, at the time of making the stanchions, three holes through the sill and only one through the movable bar; then, by knocking out the bolt, the lower end of the movable upright bar can readily be adjusted, either wider or narrower, to suit the requirements.

An extra cap will be needed in case of narrowing, but it is better to go to the trouble of making that than to nail on a board, which may be split or pulled off, the animal get loose and do more damage than the whole construction costs.

The stanchion frame should be firmly fastened in place by such means as the stable timbers best afford.

Mangers for Cattle.—Every observing farmer who uses stanchions with open mangers for feeding cattle, knows that there is something wrong in this arrangement, for he sees that no favor can be given a particular animal, and in almost every herd one or more requires extra feed and care.

It is well known that some cows are twice as long taking their food as others, some on account of poor teeth, and others from their natural habits. Then in a common open manger, animals that take in food rapidly will swallow that before them and steal from their less active neighbors, and to more effectually accomplish this, I have often seen them upon their knees that they might reach a greater distance.

Some animals, also, that have the mastery, often act very shrewdly, and draw the fodder from before those beside them first, keeping their own allowance to leisurely consume, or work over and gather the best, after the other is gone.

Sometimes grain or roots are fed to a few and not to the whole, and in this case with open mangers the neighboring animals are set into a state of agitation, and they reach and struggle to obtain a taste. If the feed is given out of the sight of others, no such commotion occurs.

Now, this fault may be easily remedied by dividing the manger into sections with boards, allowing each animal space enough to contain just the food allotted to it.

The only difficulty in using close mangers is in feeding corn stalks, but this is obviated by cutting them once or twice in two, or by feeding them out of doors, which is by far the best way when the condition of the ground and weather will admit of it.

Barn Manure Cellars.—So far as I am individually concerned, the building of cellars beneath barns for the purpose of storing manure is not approved. In the first place, I do not believe these cellars pay the extra expense and labor required. If it is the desire of the farmer to save all the fertilizing material possible, vats may be constructed outside of the barn for the purpose of holding the liquid from the stable, and cheap sheds may be constructed to protect the solid excrements from exposure to the sun. Storms do not injure manure if the liquor made by these is not allowed to run off.

In the second place, the effluvium which arises from a manure pile beneath a stable is a positive injury to stock, and the fodder stored in the barn is damaged by the gases emanating from the decomposing substances. This last objection is one of more importance than is generally considered among farmers. It is the duty of every one who has charge of stock, to provide clean and wholesome quarters for them, and in the discharge of this duty there is a profit.

A farmer, who has had a thorough experience in this line, says:

“Twenty years ago I built a barn with basement, level on the east, with the

bottom of cellar wall on three sides—all open on the east. Neither hay nor grain would keep well over the cellar; grain would grow on the bottom and hay would turn red and must on the bottom and up on the sides for a number of feet, till I made holes in the underpinning on three sides, and let the air circulate through the cellar; since then all is right.

“Three years ago, I built another barn with bank wall on the west—the rest enclosed with matched boards. The floor runs east on a level with the drive way on the west. The hay in the north bay extends from the top of barn to bottom of basement—the rest on a level with the barn floor. Under the floor and bay were stalls for eight cows, four oxen and two horses; a row of windows and doors on the south and east to the basement. These were kept open in mild weather, and closed in cold and stormy weather. One window on each end, the top six lights left open till very cold weather.

“I found the hay was spoiling against the north and east sides, and when carting for market had to use the hay knife and cut about two feet wide till I came down to the floor, and there it was not much hurt. The cold on the outside condensed the moisture on the inside, and the timbers molded and turned black.”

Barn Root Cellars.—In many localities, barn cellars for storing vegetables are made to pay richly, and I am inclined to think that profit would be derived, even in the best grain growing sections, for roots fed in winter, even in small quantities, show good results; milch cows make generous returns for them, and all kinds of stock receive benefit, as they act as regulators upon the system, increasing the appetite and giving vigor and strength.

On a common sized farm the cellar need not be large, for hundreds of bushels of vegetables may be stored in a small place; a larger one is preferable, however, if the means are at hand for constructing it. It should be located so that it may be easy of access from the barn floor, and so arranged that it may be ventilated freely, and the temperature kept just above a freezing point.

Root Cellars Out of Doors.—A correspondent, writing upon the subject of barn root cellars being built outside of the barn, says: “The best location is in a sandy or gravelly hill side, that needs no drainage in the wettest season. If not dry, it must be made so by artificial means. One half the depth of the cellar may be below the surface.

A room ten feet square and eight feet high will hold about 640 bushels, and each additional foot of length will add 64 bushels to its capacity, if filled full to the top. A narrow width is to be chosen on account of its convenience in roofing. In a region of stone, this is the best material for the walls. Build them, eight feet high and provide space for stairs and door at one end. Stone is also the best material for covering, if slabs twelve feet long can be procured to reach from wall to wall. In a granite or blue stone region these are easily procured from quarries by “gagging.”

Leave a manhole at the top, large enough for ventilation and for pouring in roots from the cart. The sides and top of the cellar should be covered with no less than two feet of earth, and neatly sodded. If on a side hill, it may be so arranged as to drive loaded teams on top. If stone for the covering is not convenient, a roof may be made by running up gable walls, putting on a long ridge pole and rafters arranged like a common roof. The rafters should be placed near enough to touch one another, or nearly so, and be strong enough to hold the covering of earth. Batten the rafters with slabs and cover all with earth and sods.

In a region where wood is plenty, and there is no stone, the whole wall may be made of logs. When finished, it will be simply a log house under ground. It will serve a good purpose for many years. Concrete also makes excellent walls, and this material may be laid in the form of an arch. If the cellar is made of stone it should be cemented to keep out all depredators.

Barn Thrashing Floors.—The large floor of the barn should be lined when it is laid to prevent the loss of seeds and grain. When putting down the floor, first cover the sleepers with half inch stuff, and put on the planks so that joints are broken. Some put lining only under the cracks. In such a case, the centers of the planks are not supported, and will jar when a team or wagon comes upon them, or when the flail is used.

SHEDS FOR STOCK.

Cheap Milking Shed.—When a farmer, not skilled with tools, desires a good building erected, he is under the necessity of employing a carpenter; but because he is not able to have what he desires, his stock need not be made to suffer thereby.

A shed may be built by any one who can use a hammer and saw, so as to not be unsightly, and afford good protection from storm.

On one side of the yard make a tight board fence, five or six feet high, then in the yard, ten or twelve feet from fence, set post eight feet high, directly in front of the fence posts. Put on a plate at the tops of the long posts to run parallel with the fence. Put another plate through the center parallel with the other, supported by post, then put on a board roof. The ends may be boarded or not, as you may choose.

As this shed is chiefly for affording shelter from rain and sun in the summer it may be left open at the ends.

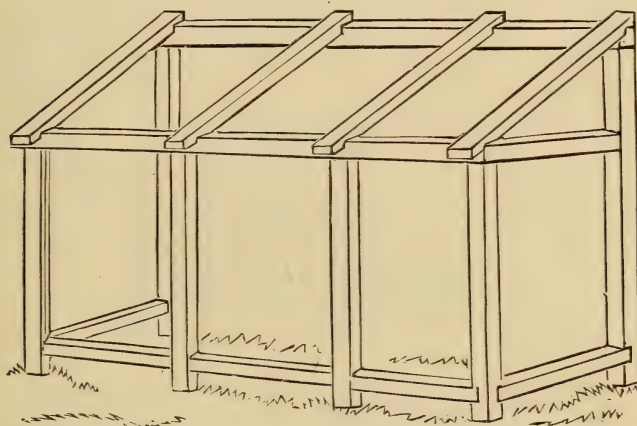
Sheds of this kind also afford a protection from cold storms later in the sea-

son, before horned cattle are put in the stable, or for those that are left out during winter.

To Make a Sheep Shed.—The same structure as described before, with the ends boarded down to within two and a half feet of the ground, will shut out cattle and afford a good shed for sheep.

On the same plan a larger shed may be built in any location desired. Make two parallel side walls after the manner of the tight fence, twenty feet apart, and as long as desired; then set the high posts in the center and roof down each way. Racks for sheep may be put in as described under head of "Racks for Sheep."

Frame Shed.—Where it is desired to make a more sightly piece of work, a frame may be made of scantling of any size desired. A simple form of putting the work together is shown in the illustration. A good sized stone, with an upper flat surface, should be used for the scantling posts to rest upon.



SIMPLE FRAME FOR STOCK SHED.

Double Shed.—A Western farmer gives his experience in making a double shed and stable, which will commend itself to many:

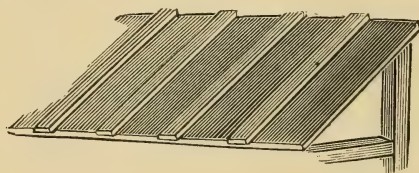
"I used for many years a shed and stable twenty-eight by forty feet, built by setting strong posts, eight or ten inches in diameter, in the ground firmly, in four rows; the two outer rows were made to be about six feet high above the ground; they were set ten feet apart, requiring ten posts for a forty foot stable; the four rows will require twenty posts. As a hay roof is best to be quite steep, the two center rows were made much taller than the outside ones; ten feet is none too much to add, making them sixteen feet high. These center rows were set eight feet apart, which will allow of a wagon being driven between; the

outer rows are then placed ten feet from them, to allow room for stalls and plenty of room behind for passage way.

"The rafter plates on the rows can be set in notches cut in the tops of the posts, unless you have secured posts which have forks at the top, which are the best, as they will hold the plates more securely in place; the rafters are made of poles of sufficient size to bear the weight of the roof; for a thatch roof, they are put about four feet apart; they are secured at the top by lapping the ends of each pair, and then driving a pin through holes bored for the purpose.

"The next move is to nail the 'ribs' on which to lay the thatching; these may either be made of long slim poles, or strips of boards about two inches wide; they are nailed on the rafters about a foot apart, though this is dependent on the length of the thatching to be used. There is nothing better for this purpose, I think, than the coarse slough grass, to be found all over the West in abundance."

Board Roofs for Sheds.—Board roofs, as commonly made, are not of much account; but they may be made both water tight and inexpensive by the following plans: Put a very thin board, three inches wide, beneath the boards where they come together, and nail the boards in the center. This will make them a little hollowing. Then cap the cracks with cleats four inches wide, beveled from center both ways. Thus the joints are doubly secured. Some cheap paint beneath the caps makes it all the better.



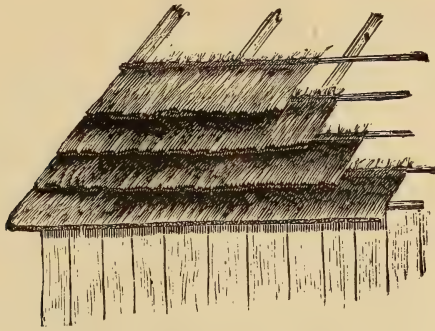
BOARD ROOF WITH BATTENS.

Another way is to drive nails into the plates so that the heads are up a quarter of an inch; then nail the boards in the center. The nail heads will hold the edges up from the plates, so the water that passes the cap cleat will follow the edge of the board down to the eaves, as it will not come in contact with the plates and drop into the sheds. The cap cleats should be made as before suggested.

Thatching Shed Roofs.—A farmer has furnished the author with his method of thatching, which is very simple and complete:

Take straight straw and of sufficient quantity to make one good sheaf, and of that one make two sheaves, or rather, a twin sheaf, that will be about four inches each part in diameter when completed; that is, take straw as above mentioned, then bind with sufficient straw to make a good band; then put the butt against something to make it even. Now hold the sheaf up before you, divide the same into two equal parts, and hold a part in each hand; hold firm

in your left hand, then turn that in your right hand a complete somersault, twisting the band and bringing tops together again, and instead of one sheaf you have a twin sheaf, which, when so made, should be very tight under the band.



ROOF THATCHING WITH STRAW.

Make the quantity you need as above described ; then take the quantity necessary for the lower or eaves row, and if you have a feed cutter, thrust them in there, one or more at a time, and cut off the uneven straws at the butt.

All things being ready—the lathing nailed on eighteen or twenty inches apart—draw a line for the eaves row, so the eaves will be straight ; then commence by laying a thin sheaf flat down at one end of the eaves, with the top up ; take some of the outer sheaf near the twist in the band, leaving it fast under the band, and twist it like a rope ; draw the same under the lath in such a way as to secure the end sheaves.

Now add straw to the rope from the second sheaf, and twist it together, and draw it over the same sheaf and under the lath ; then lay down the next sheaf close by the side of the first ; add a little straw if necessary as before to the rope as you proceed to the end, and then secure your rope well.

Then commence the second row by laying on, tops down, and secure as before ; and so proceed by adding row to row until you get to the comb, the upper rows always lapping over the row beneath, which makes a roof some six or eight inches thick.

The thatcher will see by this mode that the rope of straw on the upper row will be exposed to the weather and an opening between the sheaves, so that it would leak at the comb.

This opening may be covered in one or two ways. Two wide boards may be nailed together, like the ridge board of any building, and put on and fastened down by wires, or you may lay loose straw on the upper row, of sufficient thickness ; then fasten the same with splints, such as basket makers use, if they can be obtained—if not, use fine wires—and sew it fast to the straw rope in the same manner that straw hives are sewed together.

In laying the upper row on the first side, let the loose straws extend above the level of the other side, and with a paddle beat them level. When you finish the last side let it project above, and then trim the comb and eaves in a workmanlike manner.

Coal Tar Flat Roof.—Where it is desirable to make a roof nearly flat, it may be done by means of coal tar, fine sand, or road dust. As to the way of doing it, a farmer writes: "Several years ago, I made a flat roof in the following manner: I first laid jointed flooring boards upon the rafters, and covered this surface with roofing paper and road dust, then poured upon sections of the roof small quantities of raw coal tar, spreading it evenly with a shingle, to the depth of half or three-quarters of an inch; that is, as long as the dust continued to be wet through to the top by the tar. It took me but an hour or two to go over the whole roof, 13x18, in this manner.

"My first application was made in May; and about six weeks later I went over the whole surface again, in like manner, finishing up with the fourth application in September. Since the first application of the tar and dust, the roof has not leaked a drop, and appears good for a century to come. Since the first year, eighteen years ago, it has been like a firm sheet of stone, about half an inch thick, upon which the children can sit, walk, run or dance, without injury to the roof."

FEEDING BOXES FOR CATTLE.

Boxes for Stalls.—When ground feed is given to cattle in their stalls, a way other than pouring the meal upon the floor or using common boxes and pails should be adopted. A pail or small box is very liable to be overturned, and if the feed is given upon the floor much of it will be scattered and lost while the animals are trying to gather it with their tongues. Feeding boxes should be made flaring, and so constructed as not to be easily upset. They can be made with but little expense.

How to Make a Flaring Box.—Take a soft wood board, about eight inches wide and one inch thick, to make the sides form. Cut two pieces from the board first, to be used as patterns, which will greatly facilitate the work. Make the first ten inches wide at one edge, and thirteen inches at the other, and the second twelve inches at one edge and fifteen at the other; then cut any number you desire from these patterns. By reversing the scribe board each time, but one saw cut will have to be made for each side piece.

When the boards are nailed together, you will have a bottomless box ten inches square at the bottom and thirteen at the top. Now plane off the bot-

tom edges so that they will set down evenly upon a level surface and fasten on a bottom board fourteen inches square, by nailing through into the sides.

Boxes made in this way cannot be easily overturned, and besides, cattle can readily eat their grain without any loss of the feed. The board used for making the boxes should be planed on one side before sawing it up, so that the inside of the boxes may be smooth.

Using Feed Boxes.—If grain is to be fed once a day, it is best to arrange the boxes in the mangers, and put in the feed before letting in the cattle. This practice will bring the stock promptly to the barn, and make them anxious to enter the stable. If grain is given while the animals are in their stalls, remove the hay or oats from the manger, set in the boxes, and then deal out the grain in such quantities as desired for each.

FEEDING RACKS FOR SHEEP.

Racks in Sheds.—If sheds are used to feed sheep in, it is always best to construct racks around next to the walls, so that the hay may be put in from the outside. They are easily made by driving stakes of scantling twenty inches from the sill inside and six feet apart; nail on boards about one foot wide at the bottom, and others, narrower, eight or ten inches above these. Cleats may be nailed up and down once in ten inches, if desired, so that each sheep may have a stall by itself; but I do not approve of this plan if there are any horned sheep in the flock.

Cut away the weather-boarding from the sill outside, up eighteen or twenty inches; put a girth on the inside just above the opening to stay the siding; then a broad board, or two cleated together, should be hung by leather or strap iron hinges on the outside. This door may be raised and the hay put in without disturbing the flock.

It is a bad plan to enter a shed filled with sheep carrying a fork full of hay; the animals are frightened, and in their rush to get out, the weaker ones are knocked down and trampled upon, and the less fearful get their fleeces filled with seed and chaff as the hay is passed over their backs.

In warm weather, the drops on the outside of the shed may be left up, thus forming a good ventilation for the shed. This opening also increases the comfort when used as a milking shed in hot, rainy weather.

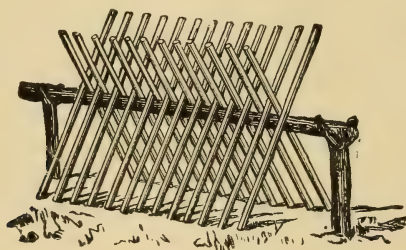
Portable Sheep Racks.—For outdoor feeding they are made simple and cheap; all of the material required for a single rack is four boards twelve feet long, two of them twelve and the other two six inches wide; four more of the same widths, thirty inches long; six posts, thirty inches long, for uprights in the corners and the center, of two by three scantling.

Nail the boards to the uprights, wide ones at the bottom two inches from lower end of scantling, and the narrow boards ten inches above these; that is, leave a space of ten inches between the two for the sheep to put their heads in.

It is a good plan to have a drop board to cover this space, hung by leather hinges, so that the hay may be put into the rack before the sheep are allowed to begin feeding. When all is ready, lift the drops by turning them up and fastening with a strap or otherwise.

If desirable, cleats may be nailed across the end and middle scantling on the inside, and a board floor put in two or three inches above the ground. The ends of the rack had better be boarded up, as sheep attempting to eat from the ends crowd out those near the corners at the sides. These racks may be hauled upon a sled to any part of the farm. The plan is old, but popular, nevertheless.

Cross Slat Rack.—A rack can be easily made for either sheep or cattle by setting a couple of crotches, putting a pole therein, and driving sticks crosswise after the manner of the illustration.



CROSS STICK FEED RACK.

These racks are very good when the ground is dry or frozen. When the earth is soft more or less of the feed will likely be pulled out and trampled into the ground, but it is better then than feeding on the ground. Round poles may be used instead of sawed slats, if the latter cannot be procured.

Flaring Sheep Racks.—A farmer who used the following style of a rack recommends it very highly for sheep, as it will prevent the waste of hay. Take planks, as long as you choose, two inches thick, and eight inches wide. Bore holes with inch bit once in two and a half inches near the edge of side and ends, the side holes slanting out enough to make the rack two feet wide at top; use rods or slats eighteen inches long, shaved eight square, and fit on top piece of light scantling by boring holes corresponding to those in the bottom piece.

Put pieces of inch board across the ends and middle for supports. Put a board one foot wide on each side and the ends at top. Set the rack upon legs, two at each end, one in the center to keep from sagging. Across the bottom of

the legs nail boards long enough to keep the rack from upsetting, and it is complete.

Feeding Racks for Cattle.—There are hundreds of tons of hay lost every winter among farmers by careless feeding. I have been astonished sometimes when witnessing the amount wasted around barn-yards and stacks. This waste is entirely unnecessary, and if it were made the rule of every farmer never to feed any kind of stock upon the ground, thousands of dollars might be saved annually. There are times, to be sure, when the earth is frozen dry and clean, but if racks are not provided, full one-half of the time the hay will be dealt out either in wet, snow or mud, and a good portion lost.

When cattle are fed out of doors, which is necessary before cold weather has come, or in the spring when the days are warm, portable racks should be used around stacks and their location changed every few days; the racks should be so constructed that the stock can get at their feed handily, and at the same time made so that the hay cannot be pulled out and trampled under foot.

Double Portable Racks.—For cattle, a good rack may be made with common rough boards and a few pieces of scantling. Make them four or five feet wide, ten or twelve feet long, and two feet deep; have four by four inch scantling in the corners, and also in the center of the ends, running up twelve or fifteen inches above the top of the rack; to the latter nail in a center partition lengthwise; thus you have a double rack where cattle will eat contentedly.

Do not have the end boards or pieces of scantling reach down as low as the side boards, and then by rounding up the ends of the side boards, after the manner of sled runners, the racks may be easily drawn from one place to another.

Pole Feeding Racks.—Where scantling and board are not obtainable a good rack may be made of poles. Corner and center posts three feet long, to which are pinned side rails three in number. A foot from the ground put in cleats and a bottom of poles.

HOW TO MAKE TROUGHS.

Board Pig Trough.—A trough for feeding pigs may be made from boards in a little time, that will answer the same purpose of one dug from a log of wood. The work of making is very simple, yet not one farmer in ten can nail one up so that it will hold swill. The difficulty arises from attempting to square the ends of the side boards before nailing them together.

Take two boards, inch thick, and a little longer than the trough is to be, straighten the edges, and have one board one inch wider than the other; nail them together in V shape, only not so steep, the broadest board on the outer

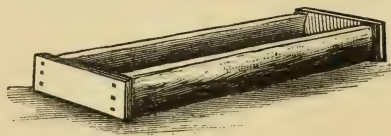
edge of the other ; then saw off the ends square, and nail on the end boards firmly, which should be about the width of the narrowest side board and from fifteen to eighteen inches long. If there is any leakage, a little cement for wood may be applied. By soaking the trough with oatmeal and water, all small cracks and seams will be closed.

Grain Trough for Sheep.—Troughs for feeding sheep may be cheaply constructed by simply nailing two boards together as described for a pig trough, but they are not well adapted for the use intended, as they are stationary, and liable to be filled with snow or ice when feeding time comes. Of course, they may be inverted, but this necessitates the flock master's staying until the sheep are through eating. A better plan is to make a trough with four sections, as follows :

Take an inch board, eight to twelve feet long, and ten inches wide, and two boards five inches wide, same thickness and length. Line the wide board in center both sides. Now set one of the narrow boards on edge, place the broad board lengthwise upon it, just so that the edge of the narrow board touches the center line, or, in other words, have the narrow board lengthwise of the broad one just its thickness out of the center, and nail down through the wide board into the narrow until it is firmly secured. Now invert ; set the other narrow board on edge and nail as the first, only the other side of the opposite center line.

Saw off the ends after it is nailed together, so as to have them square, and nail on end pieces fourteen inches square, so that the center of the quadruple trough is in the center of the boards. This feeding arrangement will be right side up ; let the ends rest on any of their four sides, and the flock master will always have a clean trough to feed in.

Troughs from Hollow Logs.—Grain troughs that will answer a very good purpose may be made from half sections of hollow logs, as shown in the illustration. The inside should be smoothed out with a large gouge. Where

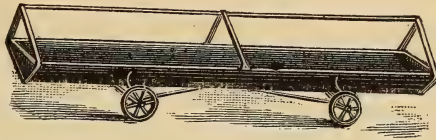


TROUGH FROM A HOLLOW LOG.

lumber cannot be easily obtained, these log troughs may be quickly constructed on a timber farm.

Wrought Iron Sheep Trough.—For feeding roots, the following wrought iron trough is much used in England. It is substantially made of wrought iron, and is fixed on four wheels, so as to be readily drawn about by a lad ; or, when required to be removed any distance, half a dozen may be hooked together and drawn by a horse, it being quite strong enough to be so used. It is nine feet long, and is made with a rod over the center, from end to

end, to prevent sheep jumping over, or getting into it; and it is so firm that it will not upset



IRON FEED TROUGH WITH WHEELS.

Watering Trough.—These can be made of pine planks two inches thick, and of such proportions as one may desire. The sides and ends should be matched into grooves and cemented with white lead ground in linseed oil. By putting on a board cover all but a foot at one end and having a trap for that, most of the trough may be inclosed in sawdust during winter and kept from freezing.

Scalding Troughs for Hogs.—An old farmer says: “I will give you a description of a scalding trough of my own manufacture, which I have used with satisfactory results for several years, and which any person understanding the use of the saw and hammer can put together in a few hours, at a trifling expense.

“First make the sides and ends of a trough, out of well seasoned two inch planks of the following dimensions: from six to eight feet long (according to the size of your hogs), two and a half feet wide at the top, two and a quarter feet at the bottom, and about two and a half feet deep. The end pieces should be grooved half an inch into the side pieces, the frame nailed together with twenty-penny nails, and further secured by two iron rods at each end, which should bolt on to small iron strips traversing the ends of the side pieces. The bottom of the trough should be of one-quarter inch sheet iron, lapped over about one inch and securely nailed to the outside of the sides and ends.

“A further addition may be made by fastening two small iron chains by staples to the sides of the trough, about two or three feet apart. When in use, these can be dropped in and over the trough, and by them a hog can readily be turned or lifted. When completed, the trough may be set on a cheap brick furnace, or a small ditch may be dug for the fire, which will answer nearly as well.

“When not in use, the trough should be first washed clean, then put away in a dry place, and by proper care it will last twenty years.”

Another Plan.—Another writer says: “The best arrangement I ever saw was a trough made of pine planks, two feet wide, sixteen inches high, six and a half feet long, wider at top than bottom, with a round iron kettle set in the bottom, water tight, set in brick in the usual way, with a block of pine wood turned to fit the inside of the kettle; a windlass above the front edge of the trough, with a hook and ropes, a crane with bows and hooks to slide hogs off on, and a stout bench for dressing.

"Fill the kettle with water, start a fire, and as soon as the water is hot and hog dead, hitch one hook into the jaw and the other into the gambrel; hoist over the box and lower on the block, which drives the water out of the kettle all around the hog. When scalded and raised out, the block floats, and the water goes back into the kettle again for the next. I have never seen anything so convenient and simple."

Board Eave Troughs.—All frame outbuildings should be protected by eave troughs. As there is an annual rainfall of about three cubic feet to each square foot of surface, an immense volume of water is flooded down from the roof of a building. A portion of this is dashed up against the wall siding and sills, and the effect can but be detrimental in causing decay. Especially around barn doors, where grading has been done for driveways, rot may be expected at an early day.

Another bad result comes from allowing thousands of barrels of water during the season to flood into the barnyard. The fertilizing substance of manure is carried away, and the water adds very materially to the depth of the mire, as well as to the period of its duration.

It is a matter of but trifling expense to put up home-made eave troughs which will carry the water away from the building, to flow off in streamlets, if not desired to store it in a cistern. Pine boards are best for making the troughs, but any well seasoned lumber, hard or soft, will do. If the lumber is inch thick, cut one-half of the boards four, and the other three inches wide, the longer the better. As a farmer is not likely to have a set of match planes, the trough may be made without.

Dress one edge of the narrow board straight, and plane the surface of the wide board where the edge of the other is to come. Now coat these two surfaces thoroughly with thick white or red lead paint and put together. If the boards are pine, they are better screwed, as expansion will draw nails; if hard wood, nail up firmly. No end pieces are required. After putting together, coat the inside thoroughly with same paint. Let the coating dry in the sun, then paint again and put up the troughs.

If lead paint is not in the farmer's possession, hot pitch may be used. In case he has neither of these, use any oil paint, and after the first coat has dried, putty the crack, crowding in all possible; then coat with two more dressings of paint.

To Put Up Eaves Troughs.—Brackets may be used the whole length of the building, or brackets—simply strips of notched boards—may be nailed on the ends of buildings and wire or hoop iron used to support the center. Wire is preferable, as it will not rust off nearly so quick as thin band iron. At one end set the trough close up to the ends of the shingle, and allow a drop on an ordinary barn of eight inches. Where the sections of trough come together, lap six inches by dropping upper one into groove of lower.

FARM MILKING YARDS.

Muddy Yards.—If there is any one thing connected with the dairy business that a farmer dreads more than another, it is a muddy milking yard; and yet almost every husbandman has one to contend with. Even if located upon rolling ground it will become soft and almost unusable during the wet season of fall and spring, by the constant poaching of cows, and the milking has to be done where the mire is nearly boot deep; and the women folks, who do fully one-half of the dairy milking, are compelled to wade there night and morning, a thing that should never be tolerated.

Double Milking Yards.—Several plans have been adopted by farmers to obviate mud, but none have appeared to entirely answer the purpose without causing great expense or considerable inconvenience; some have two or three milking yards, and as one gets well poached up, the cows are changed to another, but dry footing is not then obtained.

Others use a large meadow during the wet season, and find a comfortable and clean place for milking, for a new locality may be taken morning and evening; but I am sorry for the farmer who does not know that he had better expend considerable money upon a milking yard, than continue this ruinous practice of tramping down mowing ground while the sod is tender and the soil is mucky.

Stabling cows while milking is a much better and more profitable practice, but not always convenient, for often the yard, to be handy to the dairy house, is not near the barn.

Paving Milking Yards with Stone.—Now, it appears to me that some cheap and simple mode of paving may be done that will entirely overcome this great difficulty. Paving with stone or brick makes an excellent foundation, but would incur too great an expense in most localities, and gravel beds are not plentiful enough to furnish, conveniently, macadamizing material. So far as my experience goes, underdraining does but little good, for continual rain and perpetual treading of cattle upon the summit of a clay mound would make mud knee deep, even if cut up into yard square sections by underdraining.

Paving Yards with Wood.—The plan of paving with blocks of wood suggests itself very forcibly. The farmers, however, need not go to the expense of laying Nicholson, but may work out during the winter from his forest trees good material, and when the ground has settled in the spring, complete the work.

Blocks sawed five or six inches long, squared by taking off the sap, would, without question in my mind, make a durable foundation for milking yards. The surface of the earth should be removed at a suitable time, and foundation made

smooth ; then the blocks laid as closely as possible together, and the interstices filled with gravel, and coal tar applied, if one can afford the slight extra cost.

The expense of paving in this way cannot be great. Logs can be drawn near the spot where they are wanted while the earth is frozen, and covered with snow, and sawed up in short order by horse power. One log eighteen feet long would make from thirty to forty cuts, and if they were large enough to square two feet each way, would pave *one hundred and sixty square feet*. Any one can see that no great outlay of time or money would be required to put a good sized milking yard into a durable and agreeable condition.

When repairs are needed, a block can be taken up without the least damage to the rest of the paving. The blocks, before laying, may be immersed in a tank of melted tar, securing a perfect permeation of the pores with the preserving liquid.

CONSTRUCTION OF DAIRY HOUSES.

Milk and Curing Rooms.—Where several cows are kept, and cheese is made upon the farm, there should be a dairy house separate from the residence. The expense need not be great, and yet the building have a good external appearance.

The house should consist of two rooms—the milk or vat room of ordinary finish—but the curing room must have particular attention, especially where cheese is to be kept in cold weather. There are several approved methods of construction.

Double Wall Dairy House.—An old dairyman says : “ Lay a foundation with good hard burnt bricks, or with stones a thirteen inch wall. On this set a frame, say of five inch studding. After siding up, ceil on the inside, and fill in with charcoal. Overhead have a flooring and ceil beneath the joists, putting charcoal between. This is a non-conductor of heat, and also a good absorbent of foul air.

“ Have a door in one end and on each side ; at least two-thirds the distance back from the door put windows, with sash hung at top, to be hooked up to ceiling. Get wire gauze, paint it, and tack over each window to exclude all vermin, ‘from a cat to a gnat.’ Now put from four to six inches of good gravel on the floor, and pound it till it is solid ; then cement this as you would a cistern, also the foundation walls. As your frame will not extend in as far as your wall, you can put a shelf on it, say nine inches wide, which will be handy to use for various purposes.

“ Lastly, put a six inch tube of galvanized iron at the rear end, running from within a foot of the ground to two feet above the roof, with a cap on top and an

opening on each side equal to the diameter of the tube. Then, with good sweet pans, you will have milk and butter that will do to set before a queen. Scrupulous cleanliness is very important; without this, no milk house will make good butter."

Another Method.—The experience of another husbandman is given as follows: "I built a dairy house several years ago for use in winter and summer. It was twelve by fifteen feet on the outside, a common frame. Inside of this, twelve inches from the outside, I built another frame, which was ceiled with wide boards. Between the weather boarding and ceiling sawdust was filled in. Twelve inches from the top of the outside frame (the inside frame should be that much lower) I laid wide planks and covered the joints with narrow boards, and filled that space also with sawdust. My sills were under the ground and filled between with small rock and lime mortar.

"For the floor I filled some three-inches with thin stone, then took a sledge hammer and beat them up finely, and leveled off. When this was done I took thin mortar and poured over the top and leveled with a plasterer's trowel, making the whole thing rat proof. There should be two door shutters, one to each frame, for winter."

Inside Dairy House Walls.—It is not an uncommon thing in the construction of milk and cheese houses to plaster the inside wall, but this, while warmer, is not so good as ceiling, for the reason that after a time by the moving of shelves and the handling of implements, the plastering gets bruised, and lime dust and gritty substances get on the cheeses, which cannot be easily removed.

Wall Filling for Dairy House.—Various materials may be used for wall filling in the curing room of a dairy house. Charcoal is an excellent material, sawdust is good, and fine shavings of equal value. Charcoal has the advantage of not giving good lodgment for mice, but it is not always convenient for a farmer to obtain that material in sufficient quantities. Sawdust is generally accessible, and if dried and well packed, will keep an even temperature—a very essential point in cheese curing. When brick curing rooms are constructed, the double wall is dispensed with.

Temperature of Curing Room.—The best dairymen differ in opinions respecting the best degree of heat for cheese curing; some place the proper temperature at 65°, others as high as 85°. As these are extreme points, the best temperature is between the two, and accords with my own experience, in having the heat 70° or 75°. Whatever degree of temperature is determined upon, it should be kept uniform. Ventilation should not be neglected, but currents of cold air should never be allowed to pass over the cheeses. The rind of a new cheese will check into thousands of fine sections if exposed but for a few minutes to a draught of cold air.

The room should not be kept close. The deep white mold observed upon

cheeses in some rooms is caused by keeping the apartment too close. To cure perfectly, cheese needs air, but that modified, and not in rapid motion. The ventilating apparatus should be so arranged, that the dairyman can fully control it. The blue mold found upon cheese is produced by the curing room being too damp.

Dairy Spring House.—A correspondent says: "Not long ago, I constructed a spring house which is very much admired, and believing it to be very perfect in principle, I will describe it for the benefit of your readers. The house is for a small dairy, though its capacity may be doubled without increasing the size of the house, by placing another sink for water twelve inches above the one I shall describe, supporting in the same manner, and allowing the water to flow into the uppermost one first, thence to the lower one. The building is circular, ten feet in diameter on the inside, and has a ten feet ceiling.

The wall may be of brick or stone. If of brick, it need be but nine inches thick; if of stone, eighteen inches thick. The floor to be cemented on the earth. The building to be located below the spring, so that the water will flow through a pipe to the height of two feet nine inches above the floor of the dairy room. The water is received into one end and discharged at the other end of the sink in which the pans of milk are set.

The sink is the shape of a horse shoe, the opening at the heel being placed in front of the door. It is of iron, eighteen inches wide at the top and thirteen inches at the bottom, and twenty-six feet long.

SMOKE HOUSES.

Barrel Smoke House.—Dig a narrow pit from twelve to eighteen inches deep, throwing the earth all out on one side. From near the bottom of this pit dig a trench of sufficient length to hold one or two joints of stove-pipe, at such an angle as will bring the end away from the pit to the surface of the ground.

Over the end of this pipe set a common flour barrel or large cask, as may be needed, and, having removed both heads, bank up around it with loose earth, so that no smoke can escape at the bottom. Hang the hams, etc., in it, using some round stick to run through the strings.

Putting a cover on the sticks will leave space enough for draught to let the smoke pass freely. Build a smoke fire of corn cobs, damp hard wood or sawdust, in the pit, and you will have a cheap, safe and efficient smoke house with very little trouble.

Brick Smoke House.—Dig a pit six feet square, or five by seven, to a depth below frost; fill with gravel and lay a brick floor in stout mortar. Make the walls eight inches thick, and six and a half feet high. Have the door thirty inches wide and line inside with zinc. At top put on joist two by four, lath and plaster or board on top and coat with cement. Put chimney in center, and put on shingle roof. If one chooses, an arch can be built on the outside, with a small iron door to shut it up, similar to a stove door, with a hole from the arch through the wall of the smoke house.

Gum Smoke House.—A very good arrangement for smoking hams may be made from a few feet in length of hollow log, and it will last for years. The gum should be at least four feet long and may have an opening cut in one side for building a fire, or it may be set upon a brick arch, or, cheaper still, upon the ground, and a pit dug with sloping side sufficiently large to admit of a fire pan. As hams are generally smoked in the country, they contain too much creosote. This is caused by not having sufficient ventilation. The smoke should slowly pass the meat, but not be made to settle upon it. A board laid upon the sticks which cross the top of the gum to support the hams, is sufficient covering.

CONSTRUCTION OF PIG PENS.

Untidy Pig Pens.—Farmers in a majority of cases have less pride in what they do for swine than any other labor upon the premises. First class barns for horses and cattle, convenient sheds, etc., for sheep are numerous, but it is something of a rarity to see a nice airy and really convenient pig sty.

The reason of this is doubtless attributable to the generally conceived idea that the hog is a filthy animal, and not fit to occupy a decent place; but the fact is, swine are made more filthy than it is their nature to be, by being confined in unwholesome and unclean pens.

Cleaning Pig Pens.—A pen can be easily constructed so that the floors of the different departments may be kept dry and wholesome, plans for which are given on next page. The floor should be tight, on a little decline, and kept littered with good absorbents.

In the construction of pens there is a general fault in the way of having them too low between joints, most of them being not over five feet, when there should be not less than seven, so that a man may stand erect in them. I have seen many expensive pens having this fault, and the swine therein absolutely neglected, on account of the back aching work of cleaning the different sections out.

Pig Pen with Yard.—Every sty should have a good yard at one side, so that the swine may get at the earth, but they should not be allowed to run herein at will, nor should the cleanings of the pen be thrown into the yard to be mixed with the soil by the trampling and rooting of the hogs, for it is one of the most valuable manures that can be produced upon a stock farm.

Plan for a Pig Pen.—A Western swine raiser submits the following plan: "Take four sills 8x8 inches, twenty-four feet long; place them parallel on stone pillars: first three twelve feet spread, the fourth six feet from third. Thus you have a foundation 24x30 feet. Frame in end of sills, posts 4x6 inches, five feet long, with ties twelve and six feet long, framed in posts two and a half feet from sills. Ten feet from the end of the sills frame in posts 4x4 inches, eleven feet long, with ties ten and twelve feet long, framed in center, and end posts three feet from sills. Twelve feet ties go between two bents in center.

"Spike on pieces four feet long, seven feet from sills on center posts; frame or spike on plates 4x4 inches, on end of outside and center posts; put on your rafters one and one half inches (strong) by five, side up ends from rafters to bottom of sills. Side up sides to middle tie, except the last six feet space, which side up to bottom of sills. Side up center posts three feet high and twenty-four feet long.

"Divide the six feet space from twenty-four, use joist 2x6 inches, twelve feet long. Flooring one and a quarter inches by ten feet long. The joists will run from sill to sill and flooring same way as sills. The center of foundation should be two inches higher than the sides. You will then have two pens 9x24 feet, crib 5x24 feet, hall in center 4x24 feet. The hall can be floored with twelve feet plank, running lengthwise.

"This is a general outline of my plan. Any man of ordinary mechanical ability may construct the building himself, varying the plan to suit his taste. It will pay for itself within one or two years in the amount of grain saved, and in raising pigs in the spring."

Portable Pig Pen.—Another farmer gives a plan by which the pig sty may be moved by a team to any location where it is desired to feed grain, or enrich ground.

"Take two pieces of 6x8 good timber each fourteen feet long; dress one end of each in form of a sled runner, then lay them parallel eight feet apart, with the six inch edge on the ground; now take 4x4 inch scantling and halve or tenon in crosswise one piece at each end, and one foot from the ends of the runners, sinking the four inch strips one and one-half inches below the level line of the upper side of the runners.

"Lay a floor of one and one-half inch plank over one-half of the surface, say 8x7. Next mortise in 4x4 scantling at each corner and midways for posts on which to nail boards for enclosing.

"Let these four posts be flushed with the outside line of the runners; then

nail inch boards on the inside, dividing the whole with a cross fence or partition on a line of the floor. Roof over the floored part, and with a slide door shut your hogs in or out of that part, and your pen is completed."

HOW TO BUILD CORN CRIBS.

Rail Corn Crib.—Almost every conceivable kind of structure is put up for holding corn, cheap and expensive, ranging from rail pens to costly buildings, many of them economical, and many not. In large corn growing sections, where one man has many thousand bushels to store up, the amount injured by exposure to weather in a crib made of poles or rails, or the quantity destroyed by birds and vermin, men do not mind, but when a farmer raises but a few hundred bushels and keeps it to be consumed by his own stock, he cannot afford to feed a thousand rats and mice, or to have the quality of his grain damaged by exposure.

Storm Proof Crib.—There are two cheap plans upon which cribs may be built that will protect the grain entirely from storms, birds and vermin, and at the same time give all the necessary ventilation. A common size crib is built five or six feet wide at the sills, twenty inches or two feet wider at the plates, seven and a half feet high, and as long as any one may choose, but usually twelve feet.

Set strong round posts in the ground about two feet, and let them extend above ground thirty inches, and on the tops place inverted tin pans in the usual form of building rat proof cribs. Set studs once in sixteen inches along the sides and one end, framed into the sills and plates, then clap-board up the sides as you would any other building, excepting that lifters are to be nailed under each board at the studs to keep them from laying down tight.

The best way is to make wedges of soft wood, two inches wide, four inches long and three-fourths of an inch thick at base. After nailing on the first clap-board, tack to each stud one of the wedges, allowing the thick end to hang over the siding as much as the next board is to lap, and nail on the boards with ten-penny nails, and so continue until the sides are covered. This will give free ventilation, and entirely protect the grain from rain and sun, and besides make a very fine looking building.

Another Method.—Another mode is to side up and down regular crib style with strips one by two and a half inches, then nail a cleat one inch thick over this covering on the plate, and a second one at the bottom, but behind the latter put blocks once in a foot or two so that it shall be out from the building about half an inch, then put on a second covering like the first, having the center of each strip exactly over the space between the others.

The top of the last covering can be nailed with common nails, but at the bottom wrought nails should be used. Slip an ax head into the space left behind the cleat to make it firm while driving and to clinch the nails. This space left at the bottom between the two coverings is to prevent snow collecting there, or moisture being retained to rot the boards.

Fixing Over Corn Crib.—I much prefer the first style given, but where cribs are already built in the usual way of boarding up and down, the second covering may be put on to save the grain from exposure to storms, sun and birds. If the crib has been ribbed lengthwise, as is sometimes the case, it will pay to remove the covering and put it on as suggested heretofore. Horizontal covering gives lodgment for both snow and rain. If the plate cannot be nailed to, girts can easily be put in.

Any one who does not believe that corn is injured by exposure to weather, will be convinced of the importance of protecting it by tasting bread made from that which has lain a few months against the walls of a common open crib, and comparing it with bread made from corn that has not been so exposed. Then if the nutritious properties are lessened by exposure, corn becomes less valuable as a feed for stock.

Corn Crib Steps.—Make steps, or stairs before the crib door, one end resting on the ground, and the other against the sill of the crib, then drive down two flat stakes, one on each side near the foot of the steps, having them extend but a few inches above the earth, having first bored a quarter inch hole through near the tops of the stakes; then bore corresponding holes through the sideboards of the stairs and put in iron pins or bolts, thus forming hinges, so that the steps may be turned over and away from the crib, and replaced at will.

Double Corn Crib.—A grain raiser contributes his plan for crib building, which will commend itself to many: "I built a corn crib a few years ago, which I think, for convenience, has but few equals. It has never failed to keep corn perfectly, and is likewise rat proof. It can easily be filled without the ordinary way of making doors in the roof, which are so difficult to make tight. The dimensions are as follows:

"Length, thirty feet; width, four feet at sills and five feet at plates, with a projection in the middle six feet long across the crib. The main posts are eight feet from top of sills to top of plates. The posts to the projection are six feet and two inches.

"The sills are four by six, and should be of some durable wood, as they are exposed more to the weather than the rest of the frame. It stands upon seventeen posts, set in the ground two and a half feet, resting on flat stones and twenty inches above ground, fixed in the usual way, with tin milk pans inverted over them, which should have the wire rims cut off, as rats sometimes catch by these and ascend.

"The plates are three by seven inches; the posts four by six inches. The

size of the timber is immaterial ; some would not think mine large enough, but it answers all purposes. The roof is of twenty-inch cypress shingles, and extends a foot over the eaves.

"The sides of the crib are of ribs two inches wide, put on up and down, just space enough to keep in the smallest ears. The middle part is covered with pine boards, with a door in one side. In filling the crib, loose boards are used to keep the corn in each end, leaving the middle space for shelling the corn and storing the cobs which are worth saving."

Rat Proof Corn Crib.—A farmer, several years ago, gave the following to the New York Farmers' Club :

"I have a corn crib that has stood for twenty years, and has never had a rat, and but one mouse in it, to my knowledge. Posts ten or eleven feet long, and eight inches square ; mortise two feet from one end ; for end-sills, two inch mortise with tusk. Taper post from sill to the end, by hewing off inside until the end is reduced to four inches diameter ; make smooth with draw-knife, and nail on tin smooth a few inches below the sill.

"Let sills be eight inches square also ; end tie them and the rafter plates strong with moderate inter-ties. Brace well, and lath up and down with three-quarter inch lath ; dovetail or countersink joists crosswise ; lay the floor, and board up the ends with ungrooved boards ; let each bent be twelve feet long, six feet wide at the sill, and seven and a half feet at plate ; and if full to the peak, it will hold 250 bushels. I never had an ear hurt on account of the great width.

"If preferred, lay the floor with lath or narrow boards, with room for ventilation. Each post should stand on stone, about three inches from the ground, and each stone have a foundation two feet square, and, if possible, reach down below the frost."

Wire Cloth Lining for Crib.—I have seen cribs lined with wire cloth, and the idea seems to be a sensible one. It entirely prevents the entrance of rats or mice, gives plenty of ventilation, and the expense is not great. The cost does not exceed ten cents per square foot.

To Measure a Crib.—Level the corn in the crib, measure the length, breadth and depth ; multiply them together, and deduct from the product one-fifth, and you have the number of bushels in the ear ; for shelled corn, take one-half. To be strictly correct, add a half bushel to every one hundred bushels the pile contains.

Filling a Crib.—Where it is desirous to unload a wagon at the crib by use of the shovel, put a smooth board, about fourteen inches wide and six feet long into the box before filling, one end resting on the rear end board. Now, to unload, shovel down the incline plane until the bottom of the box is reached. In this way a load of corn may be cribbed and not an ear touched by the hand,

WAGONS AND THEIR MANAGEMENT.

Improved Farm Wagons.—A great improvement has been made in the construction of farm and road wagons within the past twenty years; they are not now more than two-thirds as heavy as they were, and are much more tastily built, and when made by an experienced and honest workman, just as strong and durable.

There is no use of killing a team hauling around a lumbering vehicle, and people have found it out. The chief point is to have a wagon properly proportioned, well made, and of good material.

Men have the same right to dictate when a wagon is being made for them as when getting a suit of clothes, and it is essential that they be posted in the matter.

Proportions of a Wagon.—It is a true saying, that the strength of a wagon does not exceed its weakest point; then, of course, the prominent feature in construction is perfect symmetry. For a two horse farm wagon to be used in the ordinary manner, the following dimensions are in good proportion :

Wheels made upon ten inch hubs, four feet four inches high behind, and three feet eight inches in front, felloes two and one-fourth inches deep, inch and a half wide. Axletrees according to the spindle use, I prefer three and a quarter thimble skein. Bolsters three by four inches, four feet two inches full length, and three feet two inches between the stakes. Stakes fourteen inches high, measuring from the top or face of the bolster, and two and three-fourth inches wide at the shoulder. Reach eight feet long and four inches wide at front, and retaining the same width back until past the point where the hounds strike the sides; from this, a taper to the end, which should be left two inches wide. Thickness, one and five-eighth inches.

In the construction of the coupling, I would not have the hounds come together at the front ends and lie upon the top of the reach as the old style was, with a mortise through the axletree for the reach to slide in when "letting out" the gearing. With this arrangement there is always a clattering, and besides, the strength of the wagon is greatly impaired. Where an extension is required, use a false or splice reach.

The front, or sway-bar hounds should be four feet long, two and one-half inches wide, and two inches thick. The sand board four feet long, three and a half inches wide, and three inches thick. Pole whole length, ten feet seven inches, and nine feet from hammer-hole to end. Size three by four inches at doubletree. Pole hounds two inches thick, and opened eighteen inches at back ends, and fourteen at front. Sway-bar three feet six inches long, two inches wide and two thick. Doubletree four and a half inches broad in the center, by

three and one-fourth at the ends, two inches thick. If the whippletrees are three feet long, the doubletree should be four feet long.

Size of Wagon Box.—For a wagon of the size described, the box should be ten feet six inches long, thirteen or fourteen inches deep, and extend fifteen inches front of stakes. Four feet from each end should be put on side straps—I prefer them inside—and plank step-cleats under the bottom. These cleats are very important, as they greatly strengthen the wagon box.

Shape of Wagon Wheels.—Since it has become the fashion to use wheels with but very little “dish” in them, the utility of wagons has lessened, and purchasers are the losers. For a light pleasure carriage, straight wheels may answer a good purpose, but upon farm and road wagons, either one or two horse, they are not the things.

Very many people suppose that a dishing wheel is weaker than a straight one, and seriously argue against the former, and use the latter. I admit that a wheel may be too much dished, in fact, be spoiled in that way, but at the same time I know that a moderate amount is of great benefit.

The question is often asked, Why don't wagons wear as long as they did thirty years ago? And I answer, because nearly all the modern so-called improvements have been a damage to the utility of wheels; dodged spokes in place of the straight spokes, sawed and worked out by machinery, using bent in place of cut felloes on heavy wheels, and making wheels without proper dish.

Importance of Dished Wheels.—Wheels that are made dishing will endure greater strain at the very time when strength in a wheel is required. If the wagon was always to be run upon a level road, a straight wheel would be as good as any; but side-hills, slopes, uneven roads, are to be continually met with, and I can in no place so well locate a wagon as upon a sidling road, to illustrate the advantages of a dishing wheel.

Any teamster knows that when the wheels on one side of a wagon are lower than those on the other, the pressure of the load is upon the former, and if they are dishing, the spokes stand bracing, but if straight, the pressure would have a tendency to crush the wheels over, or weaken them to a degree corresponding to the weight upon them.

Nearly the whole pressure that a wheel receives when in use, is to force the rim back or under the wagon. This you will see when a wagon slides from side to side; of course, the upper side wheels are receiving some force in a contrary direction, or, in other words, an outward pressure, but be it remembered the load upon the wagon is thrown upon the lower side.

Take two wheels, one straight and the other dishing, and place them upon the back ends of the hubs, then put weights upon the rims, and it will at once be seen that the dished wheel will stand nearly twice the pressure of the other.

Taper of Wagon Axletree.—In the taper of an axletree the slope is nearly or quite all on the upper side; that is, the under side of the axletree is

left straight, and the spindle tapered from its shoulder to end upon top side. This throws the wheel under. The breadth between the tops of the wheels is several inches more than the space between rims next to the ground, providing the wheels are not much dished.

Now, were not the wheels dished at all, they would not be self-bracing, or were they straight, striking a hard substance at the outer surface or sliding with a load, they would be turned or cupped inward and spoiled.

The object in throwing the wheel under in a wagon, is to counteract the dish that is sure to come after the tires have been reset once or twice, and make the rims throw mud away from the vehicle, when driving upon the road.

How to Dish a Wheel.—It was the rule with many wagon makers, years ago, when driving spokes, to set them front three-fourths of an inch, which would give, after the tire was set, about an inch and a half dish, which is altogether too much for a new wheel, but so far as strength and durability are concerned, preferable to one built straight.

For a farm wagon, the spokes should be driven with one-fourth dish, so that about one-half inch will show after the tire is put on.

A wheel made straight, and "brought over" by the tire, is positively damaged instead of being benefited, for the wheel is cramped out of its natural position, and will very soon show the effect of this treatment when put into service.

How to Test Wheel Dish.—Sighting across a wheel, from the front surface of one side of the rim to the other, or by use of a straight-edge, does not give the correct dish of the wheel. The distance from the shoulder of the spoke at the hub, to the line drawn from rim to rim, minus the projection of the felloes over the front surface of the spokes, shows the pitch of the spoke or dish of the wheel.

The remarks upon the construction of wheels are not based upon any floating theories, but upon my own observation, after a long experience at the bench as a wheelwright.

Broad and Narrow Tires.—For farm use, broad tires upon wagons are very much better than narrow ones; and if it is the design to have a wagon built for almost exclusive home work, I would advise the wide rim.

The advantage consists in their being drawn with greater ease over soft soil when heavily loaded, and doing grass lands less injury than narrow tires, as they do not cut through or even break the sod, while the earth is wet and soft.

Every farmer is aware of the injury done to his fields, both in spring and fall, by hauling out manure, moving fences, etc., over his pastures and meadows, by the use of common road wagons.

If all the wheeled vehicles upon our public highways were made with broad tires, they would be a decided benefit to the roads; but as there is little prospect of their being universally adopted, I would not advise a wide rim on a common business wagon. So long as narrow tires are used, our roads will be

cut up, and at some seasons of the year a broad tired wagon will run much harder than a common one.

Light Wagon Wheels.—A one horse wagon for all purposes I should make with tire one and one-fourth inches wide, and have the felloes one and three-fourths inches deep, and well rounded. Good rims are the main supports of wheels, and are usually made too light.

A heavy tire is not profitable upon a light wheel, and will not make up the lack of wood. I would much prefer felloes, on a light wagon, to be one and three-fourths inches deep, with five-sixteenth tire, than inch and a half felloes with three-eighth tire.

Double Sets of Wheels.—If a farmer can afford it, two wagons may be kept—one for the farm and the other for the road. If necessary to economize, two sets of wheels may be kept for one set of axletrees, and put to the kind of use that is desired on different occasions.

A good many farmers are now adopting the plan of having the wheels of an old or partly worn wagon cut down to about two-feet-ten and three-feet-two, and broad rims put on. In this way good, serviceable wagons are obtained with little expense, and those very convenient, as they are low, and easily loaded and unloaded.

Low Wheeled Wagons.—All who have used a saw mill truck with broad tires for hauling heavy loads when the ground is soft, have seen the advantage of them for farm purposes over the common inch and a half rim of the lumber wagon. The former will pass over sod or soil without penetrating, while the other cuts a gutter wherever it moves, and so far as draft is concerned, it is evident that the broad tire has the advantage.

As to extra expense, the difference between inch and a half and four-inch tire would be but little. The common sized two horse wagon wheels are three-feet-eight, and four-feet-four inches high, requiring over fifty feet in length of tire, when for wheels two-feet-eight and three-feet-two inches, but about thirty-five feet of tire would be used, and besides three eighths in thickness would do as well for the broad as five eighths for the narrow.

A low wheeled wagon is much more handy for loading and unloading, and any one will be convinced of the fact after using one for awhile. It is hard work to lift a box or hay rack over four feet high every time a change is made, or to put on a load of wood, stone, dirt or manure, with a box at that elevation.

Extra Wagon Wheels.—Where it is desired to have both a high wheeled and truck wagon, the most economical plan is to get two extra wheels made six inches lower than the common forward ones; then the hind wheels may be laid away at any time, and the front ones put upon the back axle, and the smallest in their places.

Resetting Wagon Tires.—When it is necessary to have the tires upon the wheels reset, it is better to take the vehicle some distance to a man who

makes wagon ironing a business, than to have it done near home by a horse shoer and general jobber. Not one country blacksmith in a dozen is well up in the art of tire setting.

The setting of tire, which should always be governed by fixed rules, is, with the great bulk of blacksmiths, governed by guess work. One says one-fourth of an inch draw is enough, another wants three-eighths of an inch, others less; few of them ever mention the required opening in the felloes. Some have a graduating scale for different sized felloes, making the draft from three-eighths to one-half inch; in this they are not governed by the size of the wheels, but by the size of the felloes and the tire. It is not to be wondered at, that with this guess rule, wheels so soon give out.

If the spokes are tight in the hub, the tire cannot affect them, and the whole strain must come upon the rim, and if any more strain or "draw" is given the tire than is necessary to bring the felloe up snug at the ends, and down to the shoulders of the spokes, the wheel will be injured by the spokes springing, and the felloes upsetting or bulging at the weakest points.

Fitting Wheels to Tire.—It is not unfrequently the case, that a blacksmith in cutting and welding an old tire, will get it too small for the wheel, and an easier way out of the difficulty is found than heating and stretching the iron. Instead of that he knocks the felloes apart at one of the joints, and saws off a piece, lessening the circumference of the rim to conform to the tire. The result is, the spokes are cramped and the wheel dished, perhaps to an unsightly extent. When having tire reset, watch for these things, and emphatically oppose the imposition.

Of course, if a wheel is felloe-bound a piece should come out. A good blacksmith will notice such a defect at once, and remedy it before he measures it for cutting the tire. The farmer can tell himself when a wheel is rim-bound, for there will be spaces all around between the shoulders of the spokes and the felloes.

Time for Setting Tire.—It is not a good plan to have tire reset in an extremely hot and dry time, for expansion will take place in the wood when cold and wet, while contraction will take place in the iron and result in the tire being too tight, and the whole will suffer thereby. The best time for having tire set is in summer, and nearly all the resetting should be done then, and upon a cool, damp day.

Experiments have proven that wrought iron is influenced by the temperature to considerable extent. Then if tire is set up snug, and no more, on a cool summer day, no harm will come from the change of season; but if the draw given is sufficient to crush the fiber of the wood, damage can but be the result. After setting, the tire should be bolted on. The old saying, "that when a tire is loose enough to run off, it ought to come off," is not a good theory to follow.

Plank Runners for Wagons.—Sometimes it happens that one is far away from home with a wheeled vehicle when a heavy snow storm comes on,

making it difficult to proceed. Under such circumstances it is necessary to improvise some means of converting the wagon into a sled.

When there is room for carrying the wheels upon the body of the vehicle, the cheapest and most effectual plan is to take two planks, a foot wide, more or less, ten or twelve feet long, and after rounding up one end of each, cut notches in the top edges for the axletrees to sink their full depth into; then frame in a couple of cross beams to hold the runners in place and the vehicle is ready to move.

No great skill is required in doing the work. The planks can be shaped with an ax; the axletree notches made by sawing two kerfs down four or five inches, and as far apart as the axletree is wide, and knocking out the pieces. The cross beams may be put in by boring auger holes and fitting in poles, small rails or scantling, with shoulders on inside of runners, and pins through the projections on the outside.

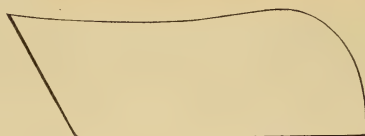
Pole Runners for a Wagon.—Where it is not convenient to carry the wheels when off the axletree, or to obtain planks, pole runners may be used. Secure two saplings of some timber that will bend, dress off two sides, and mark the spots where the wheels are to rest. The butts of the poles should be forward. If the big ends are not front, the saplings must be brought to a width the whole length. Runners which are narrower in front than behind are often very hard on the team, especially so when running in frozen sled tracks.

When the places for the wheels are marked, grooves must be cut for them to stand in, and the poles shaved down in front so as to bend. The runners are fastened to the wheels by boring holes through them and winding stout iron wire many times around the felloes and through the holes in the runners, the bent ends in front being fastened in the same way.

Double Runners for a Wagon.—The following has been described as a very effectual way of converting a wagon or carriage into a vehicle that will glide over the snow easily: Two pieces of hard wood board are used for each wheel. Cut each two and a half feet long and six inches wide, and dress off the corners for runners, precisely as if going to make a boy's board-runner sled. After the corners of one edge are rounded or curved like runners, one wheel of the vehicle is raised two inches from the floor or ground, and these two board runners bolted with three carriage bolts to the lowest spot on the rim of the wheel, one board runner being on each side of the rim.

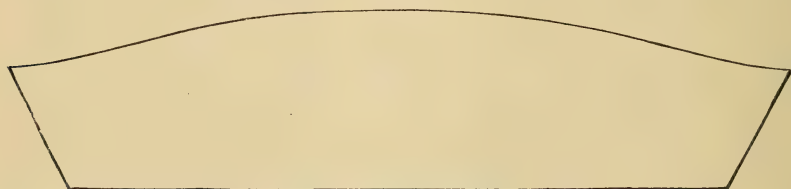
Use carriage bolts about three and a half inches long by three-eighths square at the head. One bolt is put through so as to rest on the upper side of the rim, while two other bolts pass through below the rim, near the ends of the board runners, close to the outside of the wheel. Two board runners are bolted in the same manner to each wheel. A small scantling or stick is then secured back of the hindmost springs, with each end resting between two spokes of each hind wheel, to prevent the wheels turning around. The fore wheels are fastened with a similar piece of timber, about two inches square.

To Make a Board Wagon Seat.—Take a hard wood board about a foot wide and three feet to three feet three inches long, and bevel one edge and



SHAPE OF END BOARD FOR WAGON SEAT.

the two ends to the same pitch. To do this well, a carpenter's bevel is needed. Take boards six inches wide for ends, of soft wood; cut one end square, the other beveling to correspond with bevel of bottom board. An inch and a half from beveled end, at same angle, saw board half off on flat surface, and by a gauge-mark cut out the one-half. Now tack end pieces with bevels to match edge of bottom board, and scribe in a back board eight inches wide. Take



SHAPE OF BACK BOARD FOR WAGON SEAT.

apart, shape the pieces as illustrated, and put together to stay. Do not saw end pieces to correspond to width of bottom board until the back has been fitted in. The shape of back and end as illustrated will be found easy to make, and will look very well when finished.

Cheap Spring Seat.—A very comfortable seat for a single person to occupy, when riding upon a lumber wagon, may be made by using two boards long enough to cross the box, with cleats between them. The lower board should be ten or more inches wide, three-quarters of an inch thick; the upper one same width, half an inch thick. By having two cleats, inch and a half thick between the ends, a very comfortable seat is afforded. Nail or screw two small cleats on under side of bottom board at points just outside or inside the wagon box, to prevent the seat slipping.

Extra Wagon Box.—It is just as important that a farmer have two boxes for his wagon as that he have two suits of clothes. No wagon can be kept in condition to make a respectable appearance upon the road, when one box is used for all kinds of work. The second box, for farm use, can be made at home by any one of ordinary mechanical genius, and as an aid to the work, take dimensions from the one belonging to the wagon as a guide.

To Make a Wagon Box.—The first thing to be done is fitting in the bottom boards. Cut them a few inches longer than the box is to be when finished, and saw off the ends after the whole is put together. Do not try to economize by using less than six good side straps, or going without rods, for the box will soon become so loose and rickety as to be a constant annoyance.

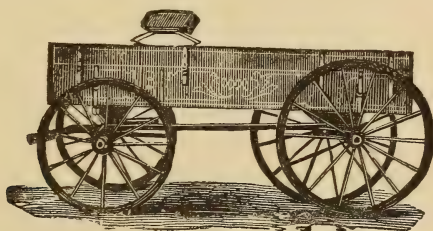
Material for Wagon Box.—Basswood is the best material, all things considered, for wagon boxes. It is tough, light, and if kept dry, very durable. Elm does very well for bottom boards, if the right kind of elm is selected, there being a great difference in the timber going under the name of white or water elm.

We have in some of our forests, quite common, a tree which is called chestnut elm, but not generally distinguished from the common water elm, so very similar is it in appearance. The wood of this tree very much resembles that of the chestnut; it is firm in grain, and will not warp more than basswood.

Beech is sometimes used for wagon boxes. It is durable, but too heavy to recommend. Pine makes a light, nice box, but is more expensive in some localities than most other lumber, and not as durable as basswood, on account of its being so easily bruised and chipped off.

Ironing Top of Wagon Box.—It pays well to iron the top of a good box, as it will add much to its utility by protecting it from being marred up by horses gnawing, or bruises from loading and unloading articles, and the wear of the seat hooks.

Never use thin flat irons, but oval of the same width the side boards are in thickness, and put them on by inserting inch and a half screws eight inches apart. A set of top irons of this kind will last a lifetime, and may be transferred from an old box to a new one when desired.



WAGON SHOWING TOP BOX.

Top Box for Wagon.—For grain and fruit hauling, a top box is of great convenience. It can be easily made with stationary end boards, and held in place by cleats and staples. The cleats should be of hard wood, and fastened by wrought nails to the top box outside, and long enough to extend down the wide box, passing through two iron staples. There should be four cleats on each side. Some put the staples and cleats on the inside, but the plan is not

commendable, for the irons will tear bags and mangle fruit or vegetables carried in the box. The top box should be painted to correspond with the box below it.

Wagon Box Platform.—By spending two hours labor preparing a platform in the wagon shed, a box may be easily put off and on, compared to the usual mode of lifting the whole from the ground. Put up a frame work each side of where the wagon stands, and the same height of the stakes. One box may be lifted up and slid off on to one platform, and the one upon the other dropped into place. This is a much better way than swinging them up.

Manure Box for Wagon.—For drawing manure, dirt, etc., rough boards put between the stakes loose answer a good purpose; but for drawing stone, sand, wood, corn, and many other things, a good box is needed.

Injuring Paint of Wagon.—Manure, if allowed to dry upon paint, will injure it more than almost any other substance, and should be washed off as soon as the wagon is taken from the barn-yard. In hot weather, when the wagon is to be used for this work several days in succession, it is policy, if time can be spared, to take a broom and pail of water and remove the adhering particles every night.

When to Paint Wagons.—During winter, while the sled is in use, farm wagons should be overhauled and painted. A coat of paint applied at this time will be much more durable than one put on in the spring, when the vehicle has to be put to use soon after receiving the new dress.

There is a right and wrong way to do everything, and it is as much of a mechanical operation to paint a wagon as it should be, as to do any other common job in the workshop.

Preparing Wagon to Paint.—In the first place, the wagon should be thoroughly washed and the rough spots made smooth, but no putty should be used until after the first coat is applied, unless there is a good body of paint upon the wood, and only one dressing is to be given. Red lead is a good finishing material for wheels and gearing.

Use but very little spirits of turpentine or naphtha, not more than a teaspoonful to a pint of the paint, but use about one gill of japan as a drier. Turpentine makes paint spread easily, and for this purpose it is used, but it has a tendency to deaden the paint and makes it less durable.

Colors for Painting a Wagon.—There is no paint more durable than a mixture of red and white lead; but color is a matter of taste, and every man should select that which suits him best.

Cream color, peach blow and red are very common and very appropriate. If the wagon is to be red, if not now well painted, give three coats; for first, use one part red and two parts white lead; second coat, equal parts of each, or else reverse the first, and the last coat all red lead.

If a lighter shade is desired, use more of the white and less of the red. If a straw or cream color is chosen, use no red lead, but shade with chrome yellow;

use the best raw linseed oil. As to mixing the material, see chapter under head of "Paints and Painting."

How to Paint a Wagon.—When painting a wagon or carriage, begin the work by painting the back side of the wheel first, and finish up on the front. Paint the wheels before touching the gearing, then begin and coat all between the axletrees, and finish up on outside of rear and front.

There are two or three rules necessary to be followed in painting : One is always finish up on the face side, or that part most exposed to view, and the second to paint from top downward ; then if any spots are made by paint dropping they appear upon an unfinished surface, and of course are removed when the job is completed.

Do not be afraid to apply paint plentifully to such parts as absorb well ; the greatest possible amount should be worked in between the felloes and tire ; it opposes the penetration of water, and thus in connection with its adhesive qualities prevents the tires getting loose.

For the box of a wagon cheaper material may be used. Venetian red changed to a rich brown or mahogany color by the use of a little lampblack, is an excellent preparation. This color makes a good contrast with red. Paint the inside of the body a dark lead color, made of white lead and a little lamp-black.

To Stripe a Wagon.—To stripe a wagon nicely requires practice ; but any one can blacken the irons if he so chooses. For this take a small brush, and use lampblack oil and a little varnish ; a good proportion would be three parts oil and one part varnish. Where striping is to be done, all of the irons should be painted the same as the wood.

Greasing Wagons.—But few people are aware that they do carriages and wagons more injury by greasing too plentifully than in any other way. A well made wheel will endure common wear from ten to twenty-five years if care be taken to use the right kind and proper amount of grease ; but if this matter is not attended to they will be used up in five or six years.

Lard should never be used on a wagon, for it will penetrate the hub and work its way out around the tenons of the spokes and spoil the wheel. Tallow is the best lubricator for wood axletrees, and castor oil for iron.

Just enough grease should be applied to the spindle of a wagon to give it a light coating ; this is better than more, for the surplus put on will work out at the ends, and be forced by the shoulder bands and nut washers into the hub around the outside of the boxes.

To oil an iron axletree, first wipe the spindle clean with a cloth wet with spirits of turpentine, and then apply a few drops of castor oil near the shoulder and end. One teaspoonful is enough for the whole.

Compound Wagon Grease.—An axle grease that can be easily made, and one that is said to work alike well upon heavy wooded or iron axles, is

made of five ounces of tallow, four ounces of good lubricating oil, six ounces of water, one-half ounce each of soda and potash, and one-half pound of plumbago.

Dissolve the potash and soda in the water; melt the tallow and mix it with the oil, and pour in the water, stirring it until the grease is cut; as soon as possible, after the water is added, turn in the plumbago. It should be stirred until the whole mass is thoroughly mixed.

Lengths of Axletrees.—Axletrees are not made of uniform length, there being a variation of some four inches, ranging from three feet eight inches to four feet; and in the second place, should they be made of exactly one width between the shoulders, the tread of the wheels on different wagons and carriages would not be alike. Supposing that all axletrees were made just four feet between the shoulders, carriages with six inch hubs, and wagons with ten inch hubs, would have a difference in tread of four inches.

Again, wagon makers differ in their opinion as regards the pitch of axletrees, some leaving them straight on the bottom, others giving them a taper of from one-eighth to one-fourth of an inch, which very materially changes the tread. Again, there is a wonderful difference made by the dish of wheels, sometimes ten or twelve inches.

Let any person go into a promiscuous collection of wagons and carriages, and with a rod measure the distance between the tread of old, new, heavy and light wheeled vehicles, and they will at once be convinced that there is no sort of uniformity.

Further than this, so long as one and two horses are used upon our dirt roads, there will be broad wheel tracks formed of a necessity. A team leaves a ridge between the beaten tracks, and a single horse will not travel upon this, and consequently makes a variation in the running place of the wheels. Any one who has driven a single horse upon rutty highways has noticed this.

Light Iron Axletrees.—For buggies and carriages, a good wrought iron axletree, so constructed that the greatest possible amount of strength can be obtained with the least possible amount of weight, is best.

For light and heavy wagons, the thimble skein, if well set, I prefer, and next to this the wooden axletree, with crotch skeins in iron boxes. Iron axletrees on lumber wagons are liable to become bent by bearing heavy loads, and but a sixteenth of an inch out of set is required to make a wagon run hard.

Repairing Broken Axletrees.—A correspondent has furnished the following, which may be of benefit to some one who breaks down miles away from a repair shop: "If the axletree arm is broken entirely off at the hub, remove the load, block up the axletree an inch or two higher at the broken end than at the other; then procure a piece of tough rail or a piece of a small tree about four feet long, and dress off one end tapering with an ax, for an axle arm, so that it will fit the hole in the hub, and lash the piece to the broken axletree with rope or wire.

"If rope is used, after it has been drawn up as tight as practicable, let two or three wedges be driven under it, and then wet it thoroughly. The rope, by contracting, will hold the temporary axle arm with sufficient firmness to enable the teamster to proceed with his load.

"In case no bit is at hand to bore a hole for a linch pin, cut a groove around the axle arm near the extremity, or drive a nail through, and wind pieces of rope or twine around the arm until a ridge is formed of sufficient size to hold the wheel from running off.

"Should the axletree give way near the middle, rather than at one of the arms, fit a piece of scantling or stout rail beneath it, letting the piece extend from wheel to wheel, and lash the ends of the axletree near the wheels."

Even if it is necessary to ride several miles to obtain a piece of rope and an ax before one can make the necessary repairs, it will be far more satisfactory to do so than to procure another vehicle, transfer the load, and afterward return for the broken one. In case a wheel were to break down, a man who is half a mechanic can easily fix a piece of plank beneath the hub, which will slide on the ground like a runner for several miles.

Portable Wheel Jack.—Take a piece of two inch plank six inches wide and two or three feet long, and set it by tenon and mortise in a short, but wider piece; brace it on each side if necessary. Cut out a piece one or two inches wide from the top, and half way down the upright timber. If there is any danger of splitting, put on a cleat across the top, which will hold it securely.

Put a lever in this slot, and fasten with an iron adjustable pin. The short end projecting beyond the upright may easily be applied to the axle, which may be raised by a slight pressure on the long arm.

A small chain fastened to the pedestal or the perpendicular will hold the lever in any given position by hitching a link to a hook in the lever. It is a simple and efficient jack for common use.

A Temporary Wagon Jack.—Take two pieces of boards two or more feet long; place one board at front of the wheel, one end on the ground and the other just under one of the spokes, close up to the felloe; then take hold of a spoke on the opposite side of the wheel and lift; at the same time place the second board under the axletree. In this way a loaded wagon may be lifted with ease.

Tongue Pressure.—Where this occurs in any machine or vehicle, it may sometimes be remedied by changing the hammer strap from the upper to the under side of the tongue. To do this it is necessary to use a screw bolt and nut, or have a substantial key in the lower end of the bolt, to keep the evener in its place. Small mules, when used to an ordinary wagon, should always draw from the under side of the tongue.

General Care of Wagons.—Keep wagons housed when not in use. Keep them well painted and wash frequently. Whenever you leave a wagon

heavily loaded to stand a number of hours, put a support under the axletree. The strength of wood cannot be estimated by what it will support for a short time. Constant pressure will show damaging effect after awhile. Wagons are abused very generally by overloading ; if the axletrees do not break, they are sprung and the wheels warped, which causes the vehicle to run hard and shortens its existence.

Oil for Felloes.—There is economy in soaking the felloes of wagon wheels with raw linseed oil. It will preserve the wood and save the necessity of frequent tire-setting.

A mechanic writes : " I ironed a wagon some years ago, for my own use. Before putting on the tires, I filled the felloes with linseed oil, and the tires have worn out and were never loose. My method is as follows : I used a long cast iron heater made for the purpose ; the oil is brought to a boiling heat, the wheel is placed on a stick, so as to hang in the oil, each felloe an hour. The timber should be dry, as green timber will not take oil.

" Care should be taken that the oil is not made hotter than boiling heat, or the timber will be burned. Timber filled with oil is not susceptible of injury by water, and is rendered much more durable by this process."



DOUBLETREES AND WHIPPLETREES.

A Common Doubletree.—This can be made as well at the home workshop as at the bench of a wheelwright, by aid of the following suggestions :

Dimensions of Doubletrees.—For heavy work the doubletree should be two inches thick and four and a half inches broad in the center, and three and one-fourth wide at the ends. A doubletree is not so stout when the taper is all made upon the back side, nor does it look as well as when tapered upon both sides. The length of it should be determined by the length of the whippletrees. Where the latter are three feet long, the former should be four feet in length. A tough piece of oak makes the best doubletree used ; however, good qualities of ash and hickory answer well.

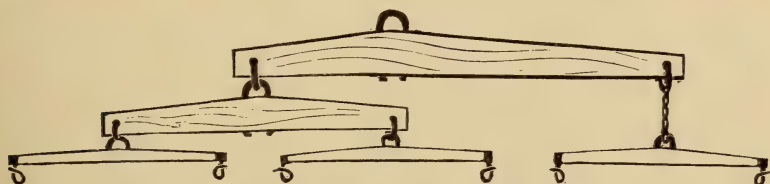
The holes for the clevises should be about three inches from the ends, and bored as far back from the center of the stick as the irons will allow.

Draw Staple for Doubletrees.—Have a staple go through the center to draw by, made of Swedes iron, and held by two nuts on the front, with a plate of iron under the nuts extending from one to the other. The staple on the back side should be heavy, because all the wear comes at this place, but the parts that go through the wood are usually twice as large as necessary. No strain can come on these parts except straight draft, and no span of horses can pull in twain two rods of iron five-sixteenths in size. If large staples are used,

the strength is taken from the wood. If the doubletree is to be used upon a wagon or sled pole, bore the pin or hammer hole well in front of the center.

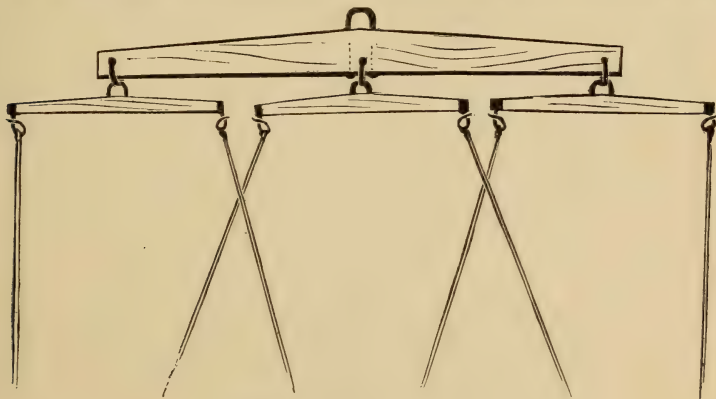
It is a good plan to have a staple in the doubletree belonging to the wagon, for there are many times when a chain has to be used to move some object, and to wind this around the doubletree injures it, and besides, a team cannot be made to draw true, as the point of draft cannot be kept in the center.

Finishing Off a Doubletree.—The best form of finish for a doubletree is oval edges and flat sides. To make this nice, first chamfer the corners—leaving the corners on for some four inches, where the clevis is applied—then with a light draw shave, cut away the chamfer corners lightly on the edges, and file to a true oval. Do not round off the chamfer corners on the flat side. Round the ends same as sides to a true oval and definite finish on flat side.



DOUBLE EVENER FOR THREE HORSES.

Three-Horse Evener.—There are several ways of making a tripletree, or three-horse evener, but the simple form has proven to be as good as any. The best way to get the measure for the long bar is to lay the double and whipple-



SINGLE EVENER FOR THREE HORSES.

trees to be used down upon the floor; then place a third whippetree at the end in row with the other two, so that the ends of all are same distance apart.

Now lay down the piece of plank from which the long bar is to be made, and mark the places where the center clevis of the doubletree comes, also the place

where the clevis of the whippetree comes ; then mark exactly back of the center whippetree where the clevis of the big bar is to come to be attached to the plow. The single whippetree should have a chain attached to bring it out even with the other two. The whippetrees should be of even length. The illustration will give a clear idea of the method of making.

Another Style.—Another and very good way to make a plow-tree, is to lay down three whippetrees of even length ; then mark off where the clevises come, and attach the whippetrees to the long bar, without the use of any double-tree. Have the center clevis in the middle, or so as to come directly in front of the plow beam. In hitching on the horses, use the tallest animal in the center and cross the tugs, as represented in the engraving. Both traces of neither one of the horses will pull upon the same whippetree, and the taller horse being in the center, the tugs will not chafe much.

Equalizing Tripletree.—A correspondent tells how he makes a three-horse evener to be used where the horses are of unequal strength. Where one horse can pull one-fourth more than either of the other two of the span, they being of equal strength, he would take an evener fifty-two inches between outside holes. Hitch the plow fifteen and a half inches from the right hand hole.

Hitch one of the span to the left end, and to the right end attach an evener thirty-six inches between outside holes, so divided as to give the strongest horse, who walks in the furrow, fifteen and a half inches, and the second of the span, who goes in the middle, twenty and a half. By varying the distance between the holes it can be arranged to suit horses of any relative strength.

Laying Out a Whippetree.—In laying out a stick, from which a whippetree is to be made, the size and kind of irons to be used upon it should be the first consideration. If the draw iron is a clasp, the center of the stick need not be as large as where a staple is put through the center.

Dress out the stick on two sides only, the whole length, and as thick as it is to be in the center—from an inch and a half to an inch and three-quarters are the common thicknesses for heavy whippetrees—then strike a line on one side through the center from end to end ; lay out the width in the center, and at the ends according to the sizes of the irons, draw two more lines from center to ends, then work off the sides and the stick is ready to be rounded up.

How to Round a Whippetree.—To do the rounding, chamfer all the corners, planing them true, then with a draw shave and file finish to a true oval. Never attempt to work out a whippetree with no other guide than the eye, for it will require a great expenditure of time and be unsightly when finished.

Length of Whippetrees.—The common length for vehicles is two feet ten inches ; plow whippetrees should not be more than twenty-six or thirty inches, or as short as they can be and not make the tugs chafe the horses' sides.

Best Timber for Whippetrees.—Tough hickory is the most suitable timber for these implements; white oak and ash are second best, but of whatever kind, the wood should be thoroughly seasoned. It is a good plan to split out material from choice timber and lay it up for future use. When seasoned or nearly so, dress the sticks out into suitable shape and of different sizes to correspond with the different irons in use, and this will greatly facilitate the making repairs when in a hurry.

Ironing Whippetrees.—The draw iron in the center should clasp the whole wood. Never use on a draft whippetree what is called plug hooks—those that drive or screw into the end. The ferrule hook is much better, *i. e.*, hook and ferrule made together of wrought iron; but better than this will it be to use what is called clasp and safety hooks.

Any blacksmith knows how to make them. They are of one piece of iron; the hook so curled that the tugs will never unhook themselves. If ironed as last proposed, make the woods inch and one-half by two and a half in the center, one inch and one-eighth broad at the ends, by one inch thick—make a true taper; oval the sides, leaving a flat surface three-fourths of an inch wide on front and back for the clasp irons. Usually whippetrees made after this style are left too large at the ends, and have a bungling appearance. Making them small at these places does not weaken the implement.

THE NECK YOKE.

Timber for Neck Yoke.—Hickory, white ash and oak make the best neck yokes. White ash is the least trusty, for it is more likely to become spalt or brittle than either of the others. The heart of oak is good, but after years of experience in a repair shop, I proved second growth hickory to be best of all. Sometimes the neck yoke is subject to heavy strain, as holding a big load when going down a steep hill, and a breakage at such a time is likely to prove disastrous.

Ironing a Neck Yoke.—In ironing a neck yoke, the purpose should be to weaken the wood as little as possible, therefore, two staples to hold the pole-iron are better than one. One staple, for the purpose of strength, is liable to be made so large as to cut away at least one-fourth of the timber in passing through. Two staples set a few inches apart, may be quite small, if made of Swedes iron. For market wagons, the neck yoke should be turned with two beads at the center, a few inches apart, and the pole-holder be made of good harness leather. There is no rattle to such an arrangement, and all the strength of the wood is left.

Length of Neck Yoke.—No one part of a wagon varies more in length than this. No particular dimensions will be given here, but there should always be a uniformity between the length of the neck yoke and the doubletrees and whippetrees; *i. e.*, where the latter are long, the former should be long also, with a short neck yoke and long gearing for the tugs, the horses are pulling at an angle and are compelled to travel somewhat sideways, which is a disagreeable position. Thus hitched, a spirited horse will chafe and fret all day, when if he could draw straight ahead he would work quietly.

Where two lengths of doubletrees and whippetrees are used, there should be two lengths of neck yokes also. The heavier the load to be drawn, the more distressing becomes the variance in lengths mentioned above.

CONSTRUCTION OF FARM SLEDS.

Length of a Sled.—As to the length of a sled, no exact number of feet and inches can be given that would suit the masses of farmers, for those used for different purposes are made of different lengths. There is, however, one prevailing fault, and that is, not making them as long as they should be.

Every farmer has, no doubt, noticed that when drawing logs, or "sled-length wood," the greater portion of the load comes upon the hindmost beam. Logs for the saw mill, twelve or fourteen feet long, have to be loaded so far forward that damage is very likely to result; the pressure of the log coming so heavy upon the pole that it is broken when turning around, or the sled chances to drop into a hollow.

Width of a Sled.—The sled should be made the same width between the stakes as that of the wagon kept, so one wood rack or box may be used for both, and only one place of storage required for these when out of use.

If a wagon box is three feet and three inches wide, and the sled made but three feet two inches between the stakes, it is not conveniently kept on; and if the wagon box is narrower than the sled, the same trouble arises. Even if there are to be boxes made for both, I would still have them the same width as above suggested, for wood racks, manure boxes, etc., may as well be used on either as the case demands.

Height of a Sled.—Use deep beams; it is but little more work to load a log upon a sled twenty inches high, than one fifteen, and the high sled will be found much more convenient when passing around in the woods.

Timber for a Sled.—Oak, beach and white ash make the best runners. Hickory splits too easily, unless very tough. Red elm is best for beams, and

tough white oak for pins. Sugar, or hard maple, makes excellent shoes, but the timber should be seasoned before used. Hickory makes the best roller. The tongue should be of ash, oak or hickory.

Length of Sled Pole.—The pole should be nine feet long from the doubletree to the end, and the doubletree set as far back as it can be, and not be liable to hit the end of the runner when in use. The closer a team is to a load the better, providing the animals have free use of their limbs. A good rule is to set the doubletree eight inches front of a line from the front of one runner to another.

The cheapest and best pole is made by framing it into the center of the roller and bracing it with seven-eighths round rod. Square iron should never be used for braces in this place, for if anything should occur to bring the horses upon them, serious damage might result.

How to Set a Sled Roller.—Another important thing in the construction of a sled is, putting the roller into the runners at the proper point. If the roller is set too high, the draft is downward; if too low, the sled is lifted. In either case the draft is not direct from the seat of the load, and much more power is required to move a load than is absolutely necessary. Set the roller on a line with the upper side of the beams.

Raves for the Sled.—Put broad raves on any sled you make. Have them extend from end of beam two inches inside of the beam pins. The advantages are numerous. They afford a good place for the driver to stand when a heavy load is being moved; they help form a broad platform when the sled is used without a box; they prevent the ends of the beams catching upon trees while in the woods or protruding objects anywhere; and they, as first stated, protect the beams from being split out from pressure upon the stakes.

Inch and one-eighth is about the right thickness for one-horse sleds, and inch and a half for heavy sleds. The raves should be of tough timber. Do not nail or bolt the plank down to the beams—fasten in no other way than by the pins, as with narrow raves, for the utility of a sled depends considerably upon the freedom it has to give when passing over uneven ground.

Protecting Sled Raves.—To prevent the plank raves being split by the stakes, either put through long bolts from edge to edge, or screw curved plates of iron on the surface, circling the stake holes. The latter mode I prefer, as it does not have the tendency to weaken the raves as the first.

The iron plates should be bent after the manner of a horse shoe, and old, thin shoes are well adapted to the place if the corks are taken off and screw holes punched through. Nailing on is not a sufficient security, and horse shoes should never be used in this place until they have passed through the hands of a blacksmith.

Sloping Sled Raves.—After the rave is well pinned on and fastened to the runners in front, taper off the plank from the outer edge of the runner to

the edge of the first beam, and round the edge off a little ; this will give a sliding surface that will throw the sled around when it comes in contact with any solid object.

Stake Holes in Sleds.—The stake holes should not be bored until the raves have been fastened on ; then drive the auger down through rave and beam, unless the beams are very narrow. In that case, it will be better to bore through the raves close beside the beams, and then put a couple of iron staples into the beam sides, one in the center and the other near the base. The staples should be made square, and the holes through the rave mortised out to correspond. For stakes, use tough oak or hickory.

Painting a Sled.—When the wagon box is used upon the sled for marketing, etc., the color of paint should be such as will correspond well. It need not be the same, for the gearing of a wagon is seldom the same as the box.

Where no regard is to be paid the box, common yellow ochre, wet up with raw oil, makes a good coating for coarse sleds ; but if any one is opposed to the color, the shade may be varied by the use of Venetian red. Add to each pint of the paint one gill of Japan, to make it set and dry good.

As to painting the entire sled, there is but little benefit further than appearance goes, as it is brushed away by crusted snow, or is bruised off by rough usage in loading and unloading wood, logs, etc. The oil that would penetrate from the paint, of course, would do a little good toward preserving the timber. The matter of appearance is all I take into consideration respecting the painting of a heavy knock-about farm sled.

I do not wish to be understood in saying that no paint at all is needed, for it certainly is. The pins should be driven in paint. The runners where the beams rest should be well coated, and also the tops of the beams beneath the raves.

Fastening for Sled Box.—Put two staples on the insides of the side boards about three inches from the ends and two inches from upper and lower edges, then two in the end boards inside close to the ends, but some four inches from the edges, then by setting the end boards in so that they hit the staples of the side boards, a rod may be run down through all four staples and the whole bound together. By having holes in the bottom boards to correspond with the staples, the rod may be slipped into these, holding all in place.

The staples may be either small and rounding and iron rods used, or square and tough pieces of hickory used for stays ; it is, however, necessary to have staples driven through the side and end boards, and firmly clinched, as considerable strain sometimes comes upon them.

Of course, no cleats can be used when this plan is adopted. The only object in constructing a box in this manner is, that it may readily be taken to pieces when it is desired to do so.

If the rod at the top is not bent at right angles so as to prevent it dropping

through the staples, the hole in the bottom boards should be bored only part way through, so as to give support to the iron.

Home-Made Bob Sled.—For some purposes, the bob sled is much to be preferred to the common two-runner sled. Bobs are not at all difficult to make. *The American Agriculturist* describes one that may be made without mortises or tenons, and with no iron except the shoes, king-bolt, and coupling clevises. To make such a sled requires only an auger and an ax, and a handy workman can easily complete one in a little time.

The Bob Sled Runners.—"In the first place, select for runners small oak or sugar maple trees with a proper natural crook; these, after being hewed, should not be less than three inches in thickness, and as deep as desired. Blocks are pinned on each runner to receive the cross-beams. The front beam should be about four inches thick, and the hind one about double that thickness. The beams and blocks are securely fastened to the runners by one and one-quarter inch hickory pins, thoroughly wedged at both ends."

The Bob Sled Tongue.—"The tongues are fitted in with wooden wedges which come well up from the roller, and two and a half inch pins should be put through both the wedges and the tongue to keep them from working loose. This will make the tongue sufficiently rigid without braces, unless some careless teamster drives around too short sometimes, when the tongue is just as apt to break as to be wrenched from its place if well wedged."

To Shoe a Bob Sled.—"In case the sleds are wanted shod, we would recommend cast steel shoes, one-eighth of an inch thick, to be put on with three inch wood screws, the holes being countersunk so that the screw heads may be quite flush with the shoe. A steel shoe is light and will not 'stick' in frosty weather, as a cast iron shoe will.

"The writer has built such sleds and shod them with common band iron, one-eighth thick, which comes cheaper than the steel, and for ordinary use is nearly as good. But for heavy work, such as drawing logs, timber or lumber steadily every day, the steel shoes are the cheapest in the end."

Care of Bob Sled.—"These sleds are very durable if taken care of during the summer, and a coat of crude petroleum put on will increase their durability. If made of well selected stuff, a pair of these sleds are good for five years, when probably they will need new pins or general repairs. There is no necessity to use seasoned lumber for making the sleds, as green timber just out of the woods will answer, as there are no joints to work loose.

"Bob sleds, as sold in the markets, are frequently too high for handy use upon the farm. While they may serve with a light load upon a smooth road, yet, when taken to the woods to use in logging, they will soon be either much racked, or break down altogether, from being keyed up too tightly when built. The low, stout, home-made pair of bobs will be found much better for rough usage upon the farm."

THE FIELD ROLLER.

Modes of Construction.—On the construction of rollers for the purpose of crushing clods or lumps upon plowed fields, I have obtained in addition to my own experience, by direct communication with good practical farmers, several styles of making this agricultural implement.

A Plank Roller.—"I procured some two inch planks, twenty inches wide; cut off two pieces forty inches long; cut another plank, one and one-half inches thick, and spiked it on well across the two first pieces; then struck a circle the full size, and dressed it smooth and round, and bored a hole in the center.

"I made four like this, then took plank four inches wide and one and one-fourth thick (one and one-half would be better); cut them three feet long; beveled the edges so they fitted nicely on the edge of these wheels, and spiked them on well with heavy fencing nails, with the ends one inch over the wheel or end of the drum; then a piece of one and one-half inches thick and about one foot square, with a hole in the center for the iron rod to pass through, and also a small crease or hole to pour melted grease into, is spiked on to the outside of the ends of the two drums. I used an old thrashing shaft cut the proper length, and squared it three inches at the ends to enter the frame. A lighter shaft will do for this size roller.

"The frame I made of three by four inch stuff, single frames, and the sections roll on the shaft. The tongue is three by six, dressed light at the point—passes through between the sections, mortised into the hind part of the frame, and notched and bolted to the fore part. The iron shaft passes through it.

"A roller thus made should be taken to a blacksmith, and have him tire it with light buggy tire (or something broader and thinner), right over the heads of the spikes—that is, if the stuff be dry; if not, wait till it is. It can be used one season without tire."

Another Method.—"I have been using a wooden roller for ten or twelve years, and think it does as good work as an iron one, of four or five sections, that costs with us \$65. I have two sections, four feet four inches each, and three feet in diameter.

"The heads are made of two inch plank, crossed and spiked or pinned together, making them four inches thick, and covered with staves of three by four scantling, barrel finish, with the staves shouldered on the inside one inch, leaving two by four inches where spiked on the heads. The frame three by four inch scantling, edge up."

Third Method.—"Take two pieces four by four inches, three feet long; halve them in the center, making a cross with arms of equal length. Then take four pieces of plank two inches thick by eight inches wide, cutting down on each end of the cross arms, and jointing the ends of the planks so that they will match,

and also leave the face of the plank and the cross exactly even by letting the plank in two inches. Then bolt solid, and cut down the outside by striking a circle, so that you have a wheel three feet in diameter.

"Make four of these wheels. Then take pieces two inches thick, four inches wide and three feet ten inches long (being common width of corn rows), and nail these on the heads with heavy wrought nails, so as to make two drums three feet ten inches long.

"Set these rollers in a frame made of oak pieces four by four inches; put an iron rod one and one-quarter inches thick through both rollers, with nuts on outside frame, riveted so as not to work off. Fix a good strong tongue, and put pins in the frame like the legs of an old fashioned bench; fasten your reaper seat on top, and you have a roller that will do good work with speed, rolling fifteen or twenty acres per day with ease to yourself and team."

Bent Felloe Roller.—"A roller should be in two sections, each three feet long, and the diameter three feet four inches. For heads, get heavy bent felloes for low wheels, and halve two by six scantling together for spokes or arms, and mortise into the rim. For covering, three by three inch scantling, beveled one-fourth inch and notched or halved one and one-half inches on to the rim, and spiked or bolted on.

"The shaft should be one and three-fourths round bar, and squared where it enters the frame, as the sections should turn freely on the shaft. The boxes could be made of wood, but would be much better of iron, and could be got at any foundry.

"The frame should be five by six feet square, sides of four by four scantling, front and back of two by six scantling, halved over on top and bottom, making a good place to slip in the tongue and fasten with bolts. Make the heads, slip them on the shaft and hang in the frame before commencing to cover, as they can be made to hang truer."

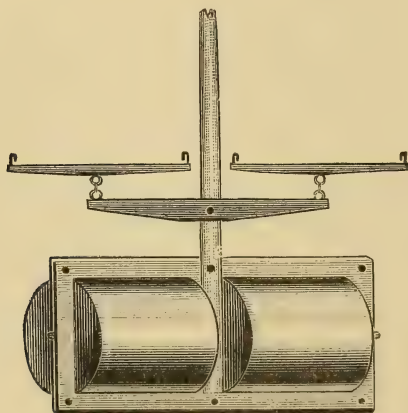
Hollow Log Roller.—When a roller is made of a log two feet in diameter, it should not be more than six feet long. "To make one, get a hollow log that is round and of an even size, true and handsome; cut off a piece a little longer than the roller is to be; block it up level; you can level it with a square and a plumb line; hew off the bark at each end, and chalk down the log, sighting by a plumb line, for the path of the saw; and for getting it at a right angle with the length of the log, take a straight piece seven or eight feet long and nail on a lath at one end, an exact right angle by the square; lay it on the top of the log, putting each end in the center by the plumb line at the end of the log; the lath will indicate how to start the saw.

"Having sawed each end off true, measure back to the center and saw it in two. If one gets it cut off nearly right first time, it will do by putting sufficient washers between the drums and the frame to prevent rubbing. Turn up the smallest end of the smallest log, and describe a circle as large as it will work,

and a smaller circle, to leave a shell from four to seven or eight inches thick ; then dress off both logs to the outside circle, all of a size ; then if it is a hollow log, chisel or burn out the inside as true as possible to the inside circle.

“ If a solid log, split it open in the center ; chop and dig out the centers to the circle ; put them together again and bore down, with a three-fourths inch auger, holes in the outside of the drum, two on each side, so as to pin the pieces together where they were split. Wedge the upper end of the pin, and the drum will be perfectly solid and strong.

“ Now frame in the end of each drum a piece of wide two or three inch plank ; find the center again, and bore an inch and a quarter hole through ; make a frame of scantling for the drums, three or four inches longer in the clear than the drums, and four inches wider ; get a one and one-eighth inch iron rod with one end upset a little, and bar one-half inch thick by four inches wide, with a hole in the center for the rod and a nut on each end just long enough to go across the middle of the frame between the drums ; slip in the rod with washers where needed ; fasten the rod from working out ; get a forked pole or split one end of one for a tongue, with a ring and staple to hitch to, and the roller is made. A seat with boxes on top should be added.”



THE SOLID LOG FIELD ROLLER.

Solid Log Roller.—More rollers are made of solid logs, perhaps, than any other way, but of whatever style they are constructed, they should be in two sections for the convenience in turning corners. They should, if of solid logs, be of hard wood, beech, ash, maple, oak or hickory.

The frame should be made of four by six inch scantling, and well pinned together, one piece between the rollers and one at each end ; one cross-piece on behind and one in front. The tongue should run through the center to the back rail, as shown in the engraving. A seat may be added if desired, but

should be so adjusted that when a man is in it the tongue will balance at the usual height of a neck yoke when upon the team.

Another Method.—"Experience has taught us some lessons about making a roller. To make a cheap and substantial roller, I take two logs, from two to two and a half feet in diameter, according to the weight of the timber used; saw off each log three and a half or four feet long; take them to a pump-shop and get a two and a half or three inch hole bored through the center of each.

"Take four wooden blocks of suitable size, say three inches thick, five inches wide, and ten or twelve inches long; let them into the end of the rails one and a half or two inches, so they may project an inch or more; bore holes in these the size of the rod used for the rollers to turn on, and corresponding with the center of the holes in the rollers; dress off the projecting part of the blocks, except about four inches in the middle, and fasten them to their places with screws.

"Make the frame of four inch scantling, consisting of two side and two end pieces, and one middle piece, well framed together; the width being somewhat greater than the diameter of the rollers, and the length such as to give them a little play. Bore holes through the middle of the cross pieces of the frame, place the rollers in the frame with an inch and a half iron rod the whole length of the frame, and having a hole punched near one end so that a bolt may pass through an end piece of the frame and the rod to prevent its turning in the frame.

"Of course, the holes in the wooden boxing must be a little larger than the rod on which the rollers are to turn. Bolt the tongue on the top of the middle cross piece, and brace it well with iron braces fastened to the front piece of the frame. A seat for the driver completes the implement.

"A roller made in this way is much more durable than made in the way we used to make them, with gudgeons driven into the rollers and turning in the frame. When the boxing wears out it is easily replaced."

A Turned Log Roller.—"First, I cut a solid, smooth white oak log, six feet long; then struck a circle on the ends and hewed it, working to a line so as to make it straight and round, taking off the sap; it was then twenty-two inches in diameter (two feet is the right size); then sawed it in two; then with an ax cut the inner end of each, concaving one and one-half inches, bored the ends and set one and one-fourth inch journals, ten inches long, sharpened at the point, having a collar on them; the outer one three inches from the end, driving it snug to the log; the inner ones one and three-fourths inches from the end. I mounted one at a time on bearings, then two men run it with their hands as a squirrel does his cage wheel, and with a jack plane, set coarse, dress it smooth.

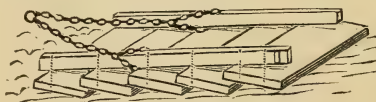
"For a frame, I made a square sash of three by four scantlings, just long enough for the rollers to run in, and eight inches broader than they were in diameter. The tongue is thirteen feet long, four inches square at the back end, halved on to the middle of the frame and fastened with three-quarter inch bolts,

bracing it with iron bars to the frame; it is cut to fit the concave ends of the roller, bored through in the middle for both journals; it is cut to one and one-half inches at the outer edge of the rollers, which leaves a space between them of two and one-half inches, which is no objection.

"They need no boxes, only thick plates spiked to the inside of the frame for the collars to run against, with good hard, seasoned wood for frame. I burn the hole with one of the journals, and provide an oil hole. It runs light and well, and it cost me just eight dollars, and is better for all practical purposes and will probably last longer than some that I have seen work that cost from forty to sixty dollars."

Field Roller Substitute.—A stone-boat makes a very good clod crusher, if weighted, and the lumps are not too dry and hard. Where no stone boat is at hand, one may be made at a very little expenditure of time and money. Take five planks about twelve inches wide, two inches thick and eight feet long; lay them flat, with the edge of one just upon the edge of another, clap-board style; then take two by four scantling, hard wood, and cut it to fit upon the top of the planks to hold them together; three of these pieces firmly bolted to the plank, one near each end.

The best way to draw this drag is by a chain passed through the scantling on each side about the second plank back. It should be drawn square, not diagonally, and may be loaded with stones indefinitely.



PLANK CLOD CRUSHER.

This implement makes a good leveler, as well as clod crusher. If the soil is damp or heavy, it has the advantage of not compressing it, if not weighted—an important feature upon clay land.

Another Method.—Take two or three hard wood planks about three inches thick, nine feet long, and with pieces of three by four joist put on cross-wise, whose forward ends come a foot or more over the front side, to put clevises for hauling the thing by; pin firmly together. The planks are laid flat, so as to form a level surface.

Chamfer the under side, so it will not clog in front. It crushes lumps, and levels and smooths the ground better, some say, than any roller can do it.

It is also just the thing for covering timothy and clover seed, or any other seeds, which need a compact, but light depth of covering. Many use this thing in preference to the roller. It must be drawn so as to cross the furrows, the last finishing of the work. A plank crusher may be made in three parts, each section four feet wide, and all hinged together. When drawn by the middle section, the wings adapt themselves to rough surfaces.

CHEAP FIELD HARROWS.

Crotch vs. Framed Harrow.—Almost every conceivable kind of device has been put into use for loosening up the soil, from the primitive crotch drag to the modern rotary harrow. No implement, I believe, has been invented that works more effectively on new or stumpy land than the old V-shaped harrow; and for well cleared fields, the common hinged or winged harrow, with thirty teeth, is used more than any other.

The last implement spoken of has some very important advantages. It does its work well, is cheap and simple in construction, and being in sections, it may be taken apart and loaded into a wagon with ease. There being two points of draft opposite each other, an equal amount of wear is made upon two sides of the teeth, and they are also kept straight.



THE THIRTY-TOOTH FRAMED HARROW.

To Make a Thirty-Tooth Harrow.—To make one of these harrows, but thirty-one feet in length of scantling is required, and this should be of tough white oak three inches square. The material should be well seasoned before working, for if it is not, the timber will check from the teeth holes, and very materially injure the implement.

Cut four pieces five feet long for outside, and two five feet and six inches for center bars; plane them up, and so that you have at least two square sides to work from. Then lay three pieces, or one-half of the harrow wood, in the proper order, and beginning four inches from one end of each short piece, mark off points for the teeth to go in once in thirteen inches. This will leave four inches at each end, and give place for five teeth in each stick. Now, with straight-edge mark across the whole, from the two points marked on the outside bars.

The slats for holding the sections together should be framed through the center of the bars and between the two outside teeth. These slats should be of good timber, and one by three inches in size, and twenty-seven inches long, so that each section shall be, when finished, two feet three inches wide. As to the manner of framing in the slats, see "How to beat a mortise," page 34.

The hinges should be made of a rod of iron long enough to run through the section from side to side and take a nut. Have a lip made upon the pivot part of the hinge, so that the sections will not go together without one-half is lifted perpendicular. This will prevent the harrow unhinging when passing over rough ground.

Those who prefer a lighter harrow, and one with the teeth less distance apart, can make it so by cutting the outside bars four feet four inches, and the inside ones four feet ten inches long, and making each section two feet wide. Put in the teeth eleven inches apart, the outside ones four inches from the ends.

It is a much better plan to fit in teeth by mortising than by boring alone. Rivets or bolts should be put through near the ends of the bars.

How to Make a Slab Harrow.—A farmer writes the author of this work that he makes a slab harrow after the following cheap fashion: "Take a slab seven feet long, thick and heavy. Put into it twenty five-eighth iron teeth, sharpened as follows: Draw a line near the front edge from end to end. Now bore with a bit the holes, first one about an inch in front of the line, next an inch behind the line, so spaced off as to take the twenty teeth to make the drag. The object of this is to prevent its clogging.

Attach a stiff tongue to it, with the rounding side of the slab down, the teeth projecting about four inches. Step on and ride or put on weights and go ahead. Lap the drag half way as you go around the same way it was plowed, and you will find the smoothest and mellowest piece of ground you ever planted corn on. It is equally good on lumpy ground, pulverizing all the lumps. See description of "Field roller substitute," page 374. The implement there described, under some circumstances, answers a very good purpose for working up lumpy soil.

STONE BOAT MAKING.

Material for Stone Boat.—A good stone boat is convenient upon the farm, especially if there are large rocks or stones to be moved. A large sized boulder may be loaded upon a boat easily, when a good deal of hard lifting would be required to place it upon a wagon, or even a sled. The best material is white oak, but any hard timber will do. A natural crook is also preferable, but one may be sawed from a log, crossing the grain,

To Make a Stone Boat.—Cut the logs eight feet long, having two feet crook and six feet body; the crook should be at an angle of about twenty degrees. From two and a half to three feet is the width at which they are commonly made.

Scantling about three inches wide should be pinned on at each side, and across at the base of the shorter section, and also at the back end if one chooses. I prefer pins of wood to iron bolts to hold on the scantling, as the heads of the latter will not wear away with the wood surface of the bottom of the boat.

As to the front, or elevated part, that may be finished according to one's means. It is best to make it in shape of a half circle, and strengthened by a band of iron, to which the drawing rings may be attached, but if a natural crook, it will be sufficiently stout without this expense.

Rings with staple going through the plank and taking a nut is a cheap way of making draw irons. A still cheaper way is to have a mortise near the two outsides of the front sufficiently large to allow the hook of a chain to pass through easily. A rod of iron or stout wood is to be placed across the flat surface of the boat through the hooks. This rod should not be longer than the boat is wide.

Stone Boat Clod Crusher.—Upon plowed fields, and especially after the harrow has passed over them once, the boat, weighted with stone, makes an excellent clod crusher. It should not be used upon clay land when the same is damp enough to pack.

Farm Tool Boat.—A tool boat, made somewhat after the manner of the stone boat, is a handy implement for a husbandman. It is easily constructed, and in the course of a year will save an immense amount of hard lifting. Take two scantlings for runners, three by four inches, and eight feet long. At one end of each scantling, taper up from narrow side in the shape of board sled runners. Two inches from the back end, pin on a scantling three inches square and three feet long. At a point six or eight inches from front end, pin on a second scantling same size and length. Fill the space between the cross scantlings with inch and a quarter hard wood plank, and spike down firmly, after boring holes for the heavy nails. The boat is now ready to move.

To provide for drawing the tool boat, staples may be put in the ends of the runners, and crotch chain used. It will be found exceedingly handy for moving open barrels of sand, ashes, etc., and for taking plows, harrows, cultivators, etc., to and from the fields. If desired, side rails may be spiked on, extending from one scantling to the other, but for common use there is no particular advantage in them.

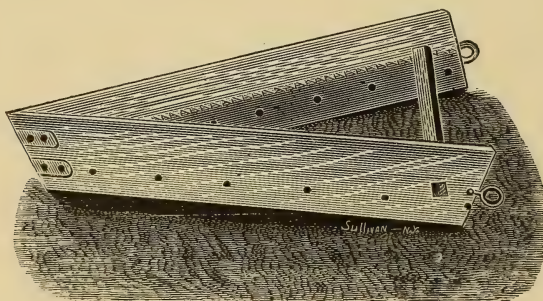
Where scantling cannot be easily obtained, poles from the woods will answer for both runners and cross pieces. Indeed, they may be used for the whole platform. The runner poles should be peeled or made smooth with draw shave on under side and the top flattened with an ax. If the front ends of the

runners have a little natural crook, all the better ; but the crook should not extend far up. The point of draught should be from the seat of the load, and there is no particular use in having the runners extend much above that point.

MACHINERY FOR LEVELING LAND.

The Best Road Leveler.—But little expense is required to make a road leveler that will do more work in a given time upon the public highway than fifty men with shovels, excepting where it is necessary to make turnpike. One should be kept in every neighborhood. A good one may be made as follows :

Take two planks twelve or fourteen inches wide and two inches thick ; saw one end of each, beveling about two inches ; *i. e.*, so that one edge will be shorter than the opposite. This is to make the top flare out when the planks are put together.



A GOOD LEVELER FOR PUBLIC HIGHWAYS.

One of these planks should be eight feet long, and the other two inches shorter. Put them together in V shape, the shortest edge down, and frame in a cross beam of four by four scantling, a little above the center, up and down, and about two feet from the ends, so as to spread them eight feet apart.

The cross beam should be framed in with shoulders, and the tenons allowed to run through six or eight inches, so that key pins may be put in on the outside.

When all is fitted, bolt a saw mill plate on to the inside of each wing, so that the back edge of the saw will come even with the lower edge of the plank. The point or narrow end of the scraper should be secured by iron clasps, as a good deal of strain comes upon this part. The scraper is drawn open end forward, by staples or clevises attached near the ends, or from the shoulders of the cross bar, and two spans of horses used.

An implement of this kind makes a sweep of eight feet, gathering in all the hubs and unnatural prominences, and deposits them in the rut holes and all interstices, making the road level and nice. If the leveling scraper should be passed over country roads once or twice a month, when the condition of the earth would admit of it, road mending would be comparatively easy to what it is now, and the condition of the public highways a hundred fold better.

A Good Meadow Leveler.—A practical New England farmer thus describes a device for leveling meadows, the utility of which will be readily seen :

“The first thing required is an old ox sled. The next thing is a knife or blade, which you can get made to order, about four inches wide and one inch in thickness on the back—the edge to be of good steel, tempered to cut equal to a scythe. This blade should be straight, and about eight inches longer than the width of the sled. Thus prepared, the sled should be turned bottom upward.

“The knife should then be placed across about midway of the sled’s length, with the edge toward the front, of course, and diagonally enough to form with the runners an angle of about forty-five degrees. It should then be sunk into the runner the thickness of the blade, and a hole should be made through the blade and runner, so that it can be firmly bolted on. Then, after turning the sled right side up, it is ready for use.

“When thus equipped, drive across your meadow, and you will see how beautifully it shaves off those bunches or deformities which have so long annoyed you. If the sled is not heavy enough to work well, put on weights of some kind. Let a man with a manure fork follow the sled and throw the detached portions into the hollows. When this is done, pass over it with a heavy roller, then put on a light top dressing of manure, and throw on a little grass seed, and you will have a spot of mowing land to be proud of.

“There are many meadows which are disfigured by little hillocks or clumps, sometimes standing as near together as hills of potatoes, and somewhat resembling ant heaps, and the nature of the ground is such that it is difficult to subdue them, or level the ground with a plow or by any convenient method.

“These humps, as they may properly be called, disfigure the meadow, rendering it almost valueless, as the grass can only be cut by hand, and it is usually of an inferior quality ; therefore any method or machine by which these impediments can be removed should be considered a benefaction.”

Where an old sled is not obtainable, and there is an objection to cutting into a good one, the blade can be bolted to the shoe of a wood-shod sled, and then inch boards screwed upon the runners front and back of the knife. The forward ends of the front pieces should be shaved down so as to conform to curve of the runner, and not obstruct the sled. Put on the boards with two inch screws, and remove at pleasure.

MANURE SPREADERS.

Timber Manure Spreader.—An implement may be made that will answer the double purpose of spreading manure and leveling meadows. It is a profitable implement to use in the spring when the sod has sufficiently dried up to prevent breaking by the treading of the team.

The spreader is made by hewing or sawing out a piece of timber four inches thick and fifteen or eighteen inches wide. A pole well braced should be put in the exact center of a flat or broad side, and an old mill saw plate bolted on the front surface, the back of the saw setting down flush or a little below the bottom edge. It should be no longer than the saw plate. This implement will thoroughly work up the manure and deposit it well pressed down into or among the roots of the grass. It will also cut away prominences in the land surface, and, grinding the same up, deposit the material in the low spots.

It may be made from green timber, as shrinkage does no harm. One, if housed, will last a lifetime, and one is sufficient for a rural neighborhood.

A Brush Manure Spreader.—A farmer gives a description of his device for manure spreading, which is as follows: Take a strong pole about ten feet long and six inches in diameter, and secure a tongue to the middle, so as to form a large T. The tongue may be bolted or secured by mortise and tenon.

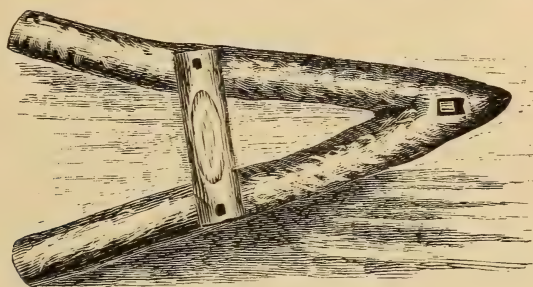
After the tongue is made fast, set it up in a perpendicular position and bore two inch holes through the head piece, one foot apart. Now fill the holes with strong spreading brush, letting the brush extend behind the cross head from four to six feet. The more brush one can fasten in the holes the better.

After the manure is spread with forks, hitch a team to the tongue, place a board on the brush behind the cross head, and let the driver stand on the board as the spreader is driven across the field, back and forth like a harrow, and the brush will then spread and grind the manure into the ground and pulverize the lumps more perfectly than can be done by hand. A man and horse team can spread an acre per hour of any kind of manure.

CROTCH DRAGS OR DRAYS.

How to Make a Dray.—An implement commonly called by husbandmen the crotch dray will be found a very handy thing upon the farm. It is especially useful for "snaking" out rail cuts or logs for a wood sawing machine in winter. It is also useful for moving bowlders and sap hauling in the sugar bush. For the latter purpose I have never found anything to equal it.

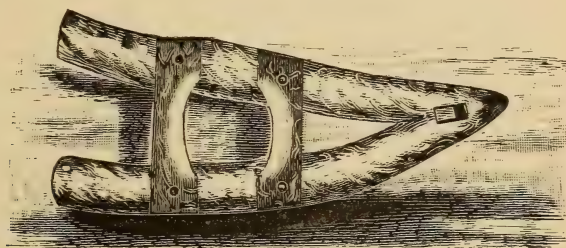
It is so easily made that it scarcely needs a description. A tree crotch is found of any hard wood with branches six or eight inches through, which will work straight, or nearly so, for six feet. The front should be worked up sled runner fashion, and tapered to nearly a point. A long mortise through the head end will afford passage for a chain hook, which may draw upon a short rod of iron or stout piece of wood lying across the mortise. A saddle beam is



CROTCH OR DRAY FOR LOG HAULING.

pinned across the center and hollowed a little in the middle, as shown in the engraving. By securing a crotch with heavier branches, the dray may be worked out and finished up in a mechanical manner, and receive a coat of paint if one chooses.

The Mitered Crotch Dray.—Where a crotch cannot be secured, the dray may be made by obtaining two sticks, about seven feet long and mitering the ends together, so that there will be a proper spread. It is better in this case to find sticks with a little natural crook, but not absolutely necessary. After mitering, dress up the front sled runner fashion, and then put through two stout pins and wedge them up firmly. Rods of iron with heads and nuts would be still better. Put on the saddle same as directed for the common crotch dray.



CROTCH DRAY FOR BARREL USE.

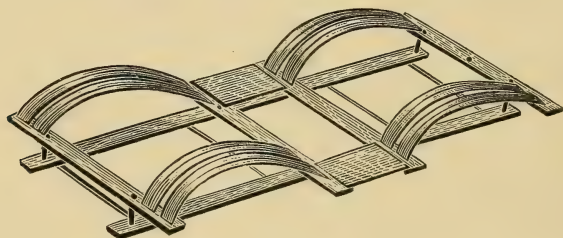
Crotch Dray for Barrel.—The crotch dray with double saddles will be found one of the most convenient implements for hauling barrels, especially in the sugar bush, that can be invented. Its advantages are, the barrel is low

down and convenient to fill; it cannot be upset, and with a single horse to draw it, it may always be taken close up to the sap bucket, as the crotch will pass over knolls, tree roots and logs without any danger of damage if the barrel is well strapped or chained on. The dray requires double saddles, as shown in the engraving.

HAY AND GRAIN IMPLEMENTS.

Cheap Hay Rack.—For the bed pieces, take two three by four inch scantling—of white oak, heavier if of softer wood—as long as the wagon requires, and frame together by four cross pieces, each an inch below the top surface of the bed pieces. The scantling should sit the broad way up. Have the two outside cross pieces ten inches from the ends, and the other two so as to divide the space equally. Of course the cross pieces are just long enough to make the bed fit snugly between the stakes of the wagon.

Four inches from the ends of the scantling set posts, two by four inches in size, and ten or twelve inches high, with round tenon, and put on a cross plank,



CHEAP AND HANDY HAY RACK.

two by six inches wide, and long enough to reach at least six inches beyond the outer rim of the wheels. The corner posts should sit broad way with length of rack, so as to give a good shoulder support to the cross end planks.

Now put two more planks of same width and thickness across the center of the bed between the wheels, and as far apart as can be and clear the wheels. Mortise each end of the four cross planks with a narrow, sloping mortise and put in thin elm wheel boards, as shown in the engraving. If boards cannot be handily procured, bore auger holes and bend small poles over the wheels. After this is done, put in a line pole, then fit boards between the wheel bows, so that they rest upon the cross planks and bolt them down. They afford good places for the driver and pitcher to sit when returning to the field. The cross planks between the wheels should be bolted to the bed scantling. The four cross pieces of bed being one inch below the surface of the bed scantling, boards for rack bottom can be slipped beneath the cross planks in center. To

prevent the rack moving on the wagon, bolt a cleat on under side of bed scantling, each side of hind bolster.

Another Method.—A variation may be made in the construction of the rack if one chooses, by using two long side pieces in place of the board bows. In that case more stakes are to be set in the bed pieces and a narrow rail put upon them, same length as the scantling, framed on ten inches above, to go between the stakes. The end planks rest upon these; then planks two by four run lengthwise, resting on end planks, one each side of the wheel rim. Cross bows will be needed over the hind wheels, but none in front. I have used both racks described, and the first is much preferred.

Improved Grain Rake.—A farmer gives some very good suggestions relative to the improvement of the common hand rake, for gathering gavels in the harvest field: "Procure some wire about one-fourth of an inch in diameter; cut it in pieces seven inches long, and dress the ends round, or nearly so, with a large file or on the grindstone. These pieces are for the teeth of the hand rake. Now take them to a blacksmith's shop or to a machine shop and have a thread cut on one end of each tooth for about one inch.

"Then drive out every alternate tooth in the head of a wooden hand rake, plug up the holes with pieces of hard wood, well seasoned and oiled, and bore other holes in the head of the proper size to receive the iron teeth when screwed in.

"The holes for the wire teeth should be bored on one side of the plugs, so that the thread on the teeth will be held by the thread made in the head of the rake. If the hole is made in the center of the plug, the tooth will soon work out. A better way still will be to take an old rake with a broken head; make a new head, into which insert the teeth."

Long Wire Rake Teeth.—When raking wheat, barley, rye or oats into gavels, one can rake much faster and with far less strength by employing a rake with teeth twice as long as the wooden teeth are usually made. When raking with short teeth the raker must necessarily exert more strength to keep his rake down than is required to move the straw along into gavels.

Old rakes, the teeth of which have been worn up to short stubs, are frequently put into the hands of boys to rake grain for others to bind into sheaves. As the teeth are so short they labor hard to accomplish what they could do with comparative ease if their rakes were provided with teeth six or seven inches long. A rake with long teeth will work far more satisfactorily at any other sort of work than one with short teeth.

Long Wooden Rake Teeth.—If wire cannot be procured conveniently, knock out the short wooden teeth and make long teeth of some tough hickory, yellow locust or any other tough timber, seasoned thoroughly. Such a job can be done on some stormy day. After a raker has become accustomed to long teeth he will not use a hand rake with short teeth, because short teeth require the exercise of more muscle,

STORING HAY AND GRAIN.

Cutting Grass.—As a general thing, grass is not cut early enough to get the greatest profit from the crop. If allowed to stand until ripe, much of the nutriment has been converted into woody fiber, and the stalks become hard and light in color. The only compensation for allowing grass to mature, is in what little grain feed is obtained by the seed, and this is nowhere equal to the loss of succulent material of the young stalks and blades.

Hay to be of best quality should not be dried any more than is necessary to insure its keeping in the stack or mow. I have succeeded in taking grass to the barn quite green and mixing it with dry straw as it was mowed away. The straw absorbs the sap, and becomes valuable of itself as a stock feed.

If the prospect of fair weather is unfavorable and hay is out, the straw mixture is certainly a good way out of the trouble, for hay, if damp or green, should not stand in cocks to sweat, for by this process much of the soluble matter is converted into carbonic acid and alcohol, and the hay will be less nutritious and healthful. When hay is properly cured, or mixed thoroughly with dry straw, there is no use of salt; but if some that is bleached or musty is unavoidably put up, four quarts to the ton may be profitably applied to give the fodder relish.

Hay Caps.—Upon many farms hay caps are used, and it is believed with great profit. The caps are easily made; they should be about two yards square, and after hemming have eyelet holes worked in each of the four corners, through which pegs are passed and forced into the ground to hold the coverings down.

If the cloth has been rendered waterproof by any of the processes given in this work, hay can not be injured in passing through a heavy storm. The only trouble likely to be the result of cocking is fermentation, spoken of above, but this will not take place if the hay is well cured.

How to Build a Hay Mow.—On small farms, where the horse fork is not used, much hard labor may be saved by building up one-half of the hay mow at a time. For instance, with the first hay drawn, fill either the right or left hand end of the bay, up as far as the big beam, then rake down the side, and while this part is settling, fill the other half. The two parts being filled at different times will not settle alike, and of course will not unite, so there will be no use for a hay knife in winter.

An important benefit of this plan is derived by lessening the hard labor while unloading. One-half of the mow being lower than the other, the top of the load may be thrown on to the highest part, and the balance below, which saves pitching from the rack over the big beam. After trying this mode of mowing away hay, it will not be abandoned.

There is still another advantage; the greatest heat caused by fermentation is

always in the center of the mow, and the seam here gives escape to the generated gases.

There is very generally a neglect among farmers to properly prepare the bottom of their bays for hay to keep well. In most cases the hay is allowed to lie upon the ground, or at best to rest upon a few poles or rails laid on the earth.

The best construction I ever used was to put in logs, fifteen inches through, across the bay, once in eight or ten feet, and upon these spread rails or poles, leaving a space between them of about two inches. This gives a free circulation below the mow, and not a pound of hay is injured if it remains there for years.

How to Stack Hay.—In the Middle and Western States farmers are in the habit of stacking portions of their hay crop, not always from want of barn room, but for convenience. Hay well stacked will keep well, but as a rule farmers should get as much of it as possible under cover and feed it there. I subjoin the following rules for stacking, which are orthodox :

“ There should never be any hollow at the top, nor on any part of the stack. The builder who makes a stack that will have a hollow in it after settling is unfit for his business. The middle of the stack should always be kept fullest—kept crowning from bottom to top throughout the whole process.

“ The builder should be active and keep in motion, treading on all parts alike as much as possible. The work should be done systematically. The builder should start from where he receives the hay, and go around the circle with it as regularly and uniformly as possible. There should be no irregularity that in settling will make a hollow.

“ Begin by taking three large, strong rails, as nearly as may be of equal size, and place them parallel and equi-distant—the distance apart of the outside two to be equal to the length of one. Cover these three entirely with rails crossing them, thus making a bottom that will keep the hay from the ground. On these place four more rails—two on the ends of the upper tier, and two on the ends of these two. Now begin with hay by piling it in the center, going from the center outward, always keeping the center crowning as before directed.

“ If the stack is to contain as much as three tons, go up with as much as one wagon load before laying out wider than the extent of the rails. Afterward the laying out should be so gradual as to prevent the hay resting on the ground when the stack is fully settled. If there be a failure in the calculation, and any of the hay touches the ground in the settling, it should be pulled out. No hay should be wasted on the ground.

“ The stack should have no corners. Neglect building on the corners of the rail foundation at the start. Start the stack in a circular form and keep it so.

“ When the weather and other circumstances will permit, the work will be done better to allow the principal part of the stack to settle twenty-four hours, more or less, before finishing.

"Do not top out around a center pole, for this conducts water down. Put on binders made by strapping two sticks or poles together with space of a few feet between their ends. These poles should not be heavy enough to bed into the side of the stack. A few forks full of swamp grass on the top is an advantage. If the sides of the stack is lightly raked down after settling it will straighten out the surface straws and make conductors to the ground for drops of rain."

Cutting Wheat.—Wheat should be cut when the grain has reached the dough state; that is, a few days before fully ripened. Cut thus, it will not shell when handling, and the grain stalk will be found to contain sufficient nutriment to fully develop or ripen the kernel.

To Stack Grain.—To stack grain that is to stand some time before thrashing so that it will keep good, requires considerable care. I have built many stacks after the following system, and always with good success. Set up two bundles where the center of the stack is to be; set others around them inclining so as to make a gradual slope to the circumference, each row of bundles half their length further out, until a sufficient diameter is obtained.

Lay the outside row double and press down firmly; then commence laying from the outside to the center, letting each row lap half the length of the one laid before it; in this way the sheaves will be bound together. Always keep the center the highest, and build the stack up perpendicular, square or round, as may suit the taste.

When high enough to begin drawing in to top out, lay two courses around projecting out a little further than the others, to form eaves. A little poor hay or bog grass may be put upon the top, and to secure it from blowing away put binders over it.

Another Plan.—A Western grain grower gives the following suggestions: "Lay your stack on as level ground as it is possible to find, say on the top of a little hill, which top is generally flat. Commence in the middle, setting up the bundles as for a 'shock;' build all around until you get as large a bottom as is desired. Now commence on the outside layers, having the butts of the bundles about even with the bottom, or a little farther out if the grain is damp.

"When this row is formed, lay the second with the butts four to six inches from the bands of the first row, and so on until you get filled up. If you find the middle getting too full, lay them in a little further.

"Here let me caution all against filling up the middle of the stack with loose or broken bundles; if you have such, bind them up or lay them on the outside, for the middle of the stack must be solid. Don't walk any further toward the outside of the stack than is really necessary.

"When you come to topping out the stack, be careful to keep the middle well filled up, and the outside as even as you can; but mind you don't get as much as one bundle with the heads the lowest; if such places occur, lay some bun-

dles on the inside, filling up the hollow before laying the outside ones, for one bundle pitching the wrong way often lets in a great deal of water.

"In finishing, when you have no more middle to fill, keep in the center, laying a bundle wherever the butt will be the lowest, until completely topped out. Force a long, nicely trimmed stake down well into the stack, to keep the wind from blowing off the top."

How to Stack Straw.—The stacking of straw as it should be done is a matter of no little importance. An old farmer says: "It is rare that I see a properly built stack. If the straw is designed for simply treading into so-called manure, it is often left after the machine is gone in a shape admirably adapted for the purpose. But nice, bright straw, especially if the grain is cut before it is dead ripe, is very readily eaten by stock in the winter, and is certainly worth preserving for the purpose.

"Any man of ordinary skill can build a straw stack. The main point is to get good sized forkfuls to place compactly around the outside, and another series of similar forkfuls to put aside and partly on top of it to bind the outside tier. Tread firmly and keep the middle well filled.

"It is better to arrange to put all the straw in one large stack, rather than in two or three small ones, and it is better to have it a little too high than too wide with a flat roof. It may take an extra man to make the high roof, but it will pay.

"Another point to be especially attended to, is to throw the chaff into the middle of the stack, or at least not to leave it in a heap where it drops from the carrier. The weak spot in the stack, and where the rain is almost sure to do the most damage, is on the side next the carrier. Special care should be taken to get the chaff and short straw away and to build up around the carrier with long straw.

"Two men on the stack, for a ten-horse machine, is enough at first, but as the stack gets higher, three will be needed. Better put on four, even, than have a poor stack. But it is not necessary. Let the farmer lend a helping hand on the stack occasionally, if necessary, and see that all is going on right.

"If thrashing out of doors, see that the chaff and fine straw which fall on the ground are thrown on to the carrier. Do not let it accumulate, for if the man gets behind he will be apt to throw up grain also. The farmer had better watch these things than work steadily himself. Let the stack be finished off at once. If this is neglected at the time it will seldom be done afterwards.

"Every bit of straw should be on the stack before the machine stops. And then make some sheaves by drawing out straw from the sides of the stack, and fill up the hole where the man stood on the roof and make the whole roof so that it will shed water. I advise, as the result of my own experience, that this be done at once and the stack finished off as though you were sure of a heavy rain before morning."

To Prepare Straw for Cattle.—A correspondent of *Land and Water*, an English paper, describes a new method of preparing straw for fodder, which is extensively practiced by the farmers of Cambridgeshire, by which its value is greatly increased. The straw is cut by a machine as soon after it is thrashed as possible, and the imperfectly cut portion is sifted out by a screen constructed for the purpose. The chopped straw is then spread on the floor of a capacious room—say some part of the barn—to the depth of about one foot. Then lay on the straw in two or three heaps—six or eight bushels in each—chopped tares, clover, grass, or any succulent vegetable that will ferment.

On these pour a few gallons of boiling water, and cover them immediately with the cut straw, which must be well trodden down as the process of filling proceeds, during which salt, in the proportion of a quarter of a hundred to a ton of chaff, may be sprinkled in.

The consolidation must be strictly attended to, and it is best to have a number of boys with a man constantly and slowly traversing the mass as it rises, so that the chaff may, if possible, be compressed as tightly as hops in a packet. In the course of a few days fermentation will set in, and probably continue for three or four weeks; the degree of heat can be ascertained by thrusting an iron rod to the center of the mass; after it has subsided, the chaff will have acquired the scent of hay, and will keep for any length of time.

In cases where clover, or grass, or green vegetables are not available, only salt is added, and some persons use half a hundred weight of salt to a ton of chaff. In treading the mass, a board fifteen inches long and six or seven in width is laced on the foot.

HARVESTING THE CORN CROP.

Cutting up Corn.—Different producers have different ways of shocking corn, and it is evident that some have a much better mode than others, as we often see fields of harvested corn with the stooks all standing erect and nice, while others are twisted about or lying sprawled upon the ground. It is no more work to cut corn and shock it right than to half do it.

Some farmers put thirty-six hills together, others sixty-four, and some one hundred, and the latter I think the wisest course, for the grain will harden or cure just as well, the fodder receive greater protection from frost, for not so much of it is exposed; the shocks are firmer and much less liable to fall over or get out of shape, and when husking there is less shifting about to be done.

If the field of corn is small, and one is desirous of husking the corn and caring for the stalks early, small shocks, say sixty hills, would be preferred, as they cure quicker than large ones.

It is a common practice to bend two or three corn hills over and entwine their tops as a support to build the shock around, yet some use a "jack," which saves the trouble and answers just as good a purpose where the stooks are made large.

The Corn Jack.—The jack is simply a pole or light rail ten or twelve feet long, with two legs put in near one end, four feet long; then back from the

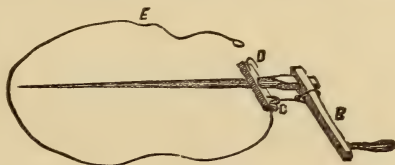


JACK FOR SHOCKING CORN.

legs four feet an inch and a quarter hole is bored horizontally; then it is ready for use.

It is placed where the shock is to be built, one end elevated by the legs and the other end upon the ground; a piece of rake handle, six feet long, or something of the kind, is slipped through the hole and the corn set up around it; when the shock is complete, pull out the stick, and then by taking hold of the elevated end of the jack it may be drawn out and placed for the next.

How to Bind Corn Shocks.—Large shocks are very difficult to bind firmly by the use of arms alone, and I illustrate here a simple contrivance for contracting the shock so that the band may be put on with ease, and firmly.



CORN SHOCK BINDER.

This implement can be made by a person of any mechanical skill. It consists of a tapering shaft three and one-half feet long, a crank, B, a washer or cross-bar, C D, eight inches long, through which the shaft passes. At C is a staple through which passes the rope, E; at D is a hook to receive the loop on the end of the rope.

The manner of use is as follows: When a sufficient quantity of stalks have been gathered and stood on end for a shock, the operator plunges the shaft through the middle of the shock, at the height where it is desired to put on the band. One end of the rope being fastened to the base of the shaft and crank, a boy takes the loop end, and going around the standing shock, brings it around and hitches the loop upon the hook, D. The operator then turns the crank, B, and the rope winds upon the shaft between the washer and the crank, and

hugs the shock into a compact body, when a band of straw or stalks can be withed around and the rope loosened for the next.

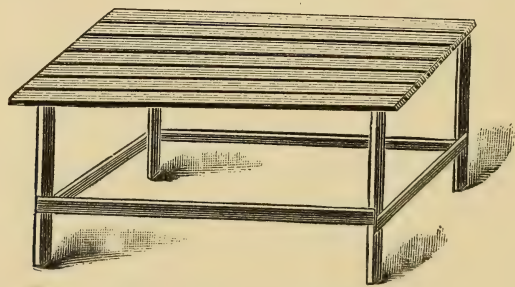
Cutting and Piling Corn.—The most rapid way to cut up corn is to drop the stalks on to the ground, forming piles of as many hills as can be conveniently carried, and after an acre or so has been cut, go through and set it up. The cutting and carrying to the shock single handfuls at a time makes a great deal of traveling and unnecessary work.

Best Corn Cutter.—The best corn cutter I ever used was made from a piece of scythe about eighteen inches long with the back removed, the blade flattened and set in a wood handle. When sharp it glides through a corn hill very easily, requiring but a light blow to sever half a dozen stalks.

Saving Seed Corn.—A few rods square of the best corn should be set apart for seed, or a few hills left here and there of the very earliest, and allowed to thoroughly ripen before cutting up. Farmers have experienced difficulty enough with poor seed corn to begin to remedy the matter, and it can only be done by saving seed from corn cut up so ripe that frost or shrinkage will not destroy the vitality of the germ.

Frost will not injure corn after it has fully ripened. There is another advantage in selecting the earliest and largest growth; by this means a variety may be obtained very productive, and that which will be many days earlier than the kind from which it originated.

Corn Husking Table.—As much of the corn is husked in the field, and in the fall of the year when the ground is soft, farmers should construct cheap tables to husk upon, to save getting down upon the damp earth, or standing by



CHEAP TABLE FOR CORN HUSKING.

the shock and handling one stalk at a time. When stalks lay horizontally before the workman, the job may be greatly expedited.

With a light table, as shown in the engraving, easy work may be made of husking. Tip the table partly over sidewise against the shock; then reach out, take hold of the band and bring the table back upon its legs and the stalks with it. The stalks can be bound upon the platform as fast as the grain is removed.

The table should be made of light material and held together by use of screws or wrought nails. The legs need not be more than two inches square, and the balance of the material three-quarter or inch stuff. One may be made of round sticks where sawed lumber is not at hand. The chief object in having the table light, is that it can easily be carried from one shock to another. The table will be found handy in the barn after the corn harvest is over. It should be about thirty inches high, four feet wide and seven feet long.

Hauling Corn Stalks.—Where shocks of corn are to be hauled from the field, no contrivance is better than the sled. Sometimes it is not convenient to use runners, however, and wheeled vehicles have to be resorted to. In such cases, a platform may be readily made upon a wagon that will answer a good purpose. Lay two four by four scantlings between the stakes; put on three cross strips of two by four scantling, long enough to extend a foot each side beyond the wheels. Bolt these to the scantlings, one at each end, and one in the center; then put on a board platform lengthwise, one board outside of the wheels. A line ladder may be put at the front end, if desired, and a binding rope used from that to hind axletree.

HOW TO LOAD SAW LOGS.

Loading on a Sled.—The common and most effectual way is to place two skids from sled to log, one resting over forward beam and the other over hind beam. Hitch a chain around the center beam, carry it under the log, then over back across the sled and hitch the team to it, and roll the log up to place. Resting upon the front beam there should be a saddle five or six inches thick, hollowed in the center to hold the log, and notched at each end, so as to straddle the stakes and keep in place.

Before starting the log up the skids, put short braces inside the sled, opposite side, to prevent the log rolling clear over. The skids should be eight or ten feet long, and as large as can be easily handled. Sharpen one end like a blunt wedge, so that it may be forced beneath the log.

Loading on a Wagon.—It very often happens that it is necessary for the farmer to take logs to the saw mill in the summer, and it is to the advantage of all to know how best to do the work.

Where the log is small and the surface between the forest and mill is level, a common plan has been to swing the logs under the axletrees of a wagon, where a truck cannot easily be obtained, or to put the hind wheels of the heavy wagon upon a false axletree and swing one end of the log up, allowing the other to drag upon the earth.

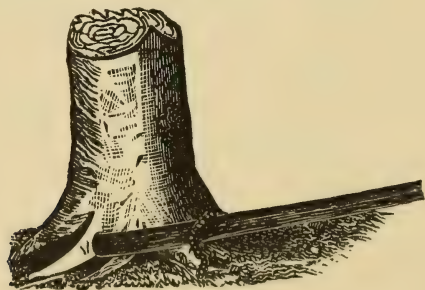
Where considerable distance is to be gone, a very good way is to put into a heavy farm wagon a long, false reach, spreading the wheels so that a log may pass between them. On the bolsters put a heavy frame and saddles, and load with skids, the same as upon the sled.

Another Method.—For loading on an ordinary wagon place the hind wheels opposite a point in the log, one-third its length from the butt end, so that the axle will be parallel with the log and ten or twelve feet from it; then let a strong skid run from the axle to the log, give a chain a turn or two around the log, so that by attaching the team the log may be rolled up the skid high enough for the fore wheels to be backed under and chained in the ordinary manner. The log should be secured while on the skid by scotching with an ax. The fore wheels once loaded, of course the hind ones will easily swing the log.

Loading a Truck.—The truck should be loaded the same as a sled. A very cheap arrangement of this kind may be made by taking the wheels of an old wagon and cutting them down and putting on broad tires. Two old tires side by side will do.

HOW TO REMOVE STUMPS.

A Cheap Stump Puller.—The lever plan of pulling stumps is doubtless the cheapest way of clearing land up rapidly. With a heavy, stout team, thirty to fifty stumps may be removed in a day. The chain should be very heavy; inch rod is none too large, but no great amount of length is required. The lever should be about twenty-five feet long, of hard wood, and some twelve or fifteen inches through at the butt.



LEVER STUMP PULLER.

Roll the large end of the lever up to the stump, dig a hole under the roots so that the chain may be put around that and the lever, then hitch the team to the small end of the lever and drive on a circle; this will tear away the root and a portion of the stump; then hitch to another root, and so on until all are removed.

The lever may rest against the body of the stump above the roots. One chain six feet long will be sufficient for a neighborhood, and I think it advisable for farmers to have some arrangement of this kind for removing stumps, instead of plowing and mowing around these obstacles year after year.

The first to the fifteenth of April is the best time to stump land. The soil is soft and spongy, and a stump that is immovable in June will readily jerk out in April.

Another Device.—A correspondent sends me a device similar in its workings to the foregoing: "Have a chain made of the best round charcoal iron, at least one inch and a fourth in diameter and eight feet long, with a ring in each end two inches and a half in diameter; one side of these rings must be formed like a link.

"Attach one ring to a band of iron two and a half inches broad, one inch thick, and one foot in diameter, with a small offset for the ring to lodge in. This band should be beveled on the inside edge, to make it slip on the pole readily and prevent cutting it.

"Cut a nice, straight, tapering hickory, white oak, or locust lever, one foot in diameter at the butt and twenty-five feet long. Take off the bark and limbs smoothly, put on the band, let it come within two feet of the large end, at which point put in two small pins of iron, to prevent it from going any further.

"Within four inches of the small end put on a common ox yoke clevis, with a ring in it to pull by. Hitch on a yoke of oxen. Drive on the right of the stump until the band passes the stump a few inches. Pass the chain round the stump on the left side and draw it tight, with no twist in the chain. A little above the lever drive in a common wedge, and put the ring on the wedge. Then gee round in a circle, until the stump is twisted out.

"This machine will take out about half the dead stumps in a field of long standing without cutting the brace roots. Common sized green stumps can be taken out also by cutting the brace roots first and digging a little.

"After everything is ready, with the team and two hands I can take up one hundred or more stumps per day, as it is no draft at all on the cattle, except the labor of pulling the lever from stump to stump."

The Crotch Lever.—Take three pieces of common joists, put them together in form like the common harrow, letting the tapering or forward ends lap by each other some six inches, making a place for the chain to rest in. The third piece is used to go across. Cut off the roots at any distance you please from the stump, place the machine on one side of the stump, tapering end up, leaning toward the stump, so as to form a leverage; hitch the chain on the opposite side, pass it over the machine; then hitch a good yoke of oxen thereto, and you will see the stump rise.

The Jack Screw for Stumps.—A farmer writes: "Having an old jack screw, I thought I would try it on stumps. I made a strong frame, three

or three and a half feet long, of two upright posts standing on a block two feet long. On the top of the posts I placed a strong beam, seven feet long; in the center I bored a hole so as to let the screw through.

"The screw is three feet long, and from it a strong chain goes around one of the roots of the stump, and then applying a lever ten feet long to turn the screw, one man at the end will be surprised to see the power there is in the machine. The frame should be made out of axletree stuff, and well braced; the chain out of three-quarter inch iron."

Burning Out Stumps.—A little excavation may be made under the stump between two of the large roots, and some combustible material put in, and then set on fire. Previous to this, however, some dry materials should be piled around the root, above the surface of the ground, and covered over with a compact layer of turf, forming a sort of coal pit.

It has been found, upon experiment, that the stumps will burn in this way a number of days, with a sort of subterranean fire; and, when the turf falls in, nearly all of the root is found consumed below and above the surface of the ground.

Machine Oil in Stump Burning.—If you have many acres to clear of stumps, get one barrel of black machine oil; then take an inch and a quarter auger and bore four holes in the largest stumps, letting the auger stand toward you in an angle of forty-five degrees; bore eight inches deep; then fill the holes three-fourths full of the oil and plug up tight. Pour, also, one-third of a pint on top, in a foot circle, and let it spread well. When done preparing, or say in five days, kindle your fires on top of the stumps and see them disappear.

Chimney for Stump Burning.—Use a sheet iron chimney, big enough in diameter to fit over the largest stump, and some six feet in height. An opening near the bottom answers for a door. The stump should be set on fire by placing around it some kindling wood inside the chimney, and the latter will produce a draft which will materially hasten the burning of the wood.

Saltpeter for Stump Burning.—In the fall bore an inch or an inch and a quarter hole, according to the size of the stump, vertically into the middle of the stump, eighteen inches deep, and put into it an ounce to an ounce and a half of saltpeter; fill the whole with water and plug it up. In the spring take out the plug, and put into the hole half a gill to a gill of kerosene, and ignite it; It will go on burning without any blaze until the whole stump to the extremity of the roots is consumed, leaving nothing but ashes. The stump must be moist; an old dry stump will not be penetrated by the saltpeter.

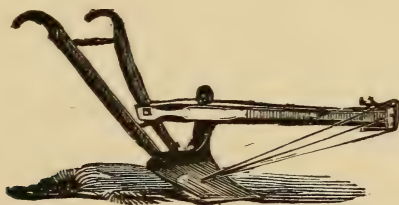
Sulphuric Acid for Stump Burning.—Bore with a two inch auger to the heart of the stump; fill the cavity thus made with sulphuric acid, or with crude oil of petroleum. In the first case, the acid becomes the destructive agent within a few months; in the latter, when the stump becomes saturated with the oil it is fired, and will then burn out to the last particle like a candle.

PLOWS AND PLOWING.

The Science of Draught.—This is a subject which should have the attention of every tiller of the soil. I cannot do better than to quote the remarks of an old plowman, whose experience with this implement accords with my own :

“When the different parts of a plow are correctly made, and the team is hitched to the implement with a correct length of draught chain, it will glide along in smooth ground (if clear of rocks, etc.) independent of any interference on the part of the plowman. There is nearly as much science in the correct understanding of the principles of draught when hitching a team to a plow as there is in navigating a ship.

“When a plowman is required to exert much strength to keep his plow in proper position to cut a furrow slice of the desired width and depth, it is a certain indication that there is something wrong in the mechanism of the plow, or that the traces, doubletree and clevis are not properly adjusted.”



LINE FOR ADJUSTMENT OF DRAUGHT.

Adjustment of the Plow Beam.—The draught ought always to coincide with a plane passing through the middle of the plow beam, and the beam stand in such a position with regard to the land slide, that the rear end of the land slide will not press harder against the unplowed ground than the forward end or point.

The beam often stands so far to the right beyond the true line, that the plow can not be made to run satisfactorily when a strong plowman does not hold it with a firm hand. If such should be the case, unscrew and take out the rear bolt, bore a hole to the left of the one in the beam, chisel out between the two holes and then it can be adjusted to a fraction by inclining the beam to the left.

By drawing lines from the mold board to the end of the plow beam, having the lines, in imagination, terminate at the tug attachment of the horse's collar, it may be readily seen that the lowering and raising of the clevis is necessary when there is a change of team, unless the animals are of the same height and the tugs of exactly the same length.

Length of Plow Doubletree.—"One serious difficulty in the way of adjusting a plow so that it will run without holding, is in using a doubletree several inches longer than it should be. A doubletree is liable to be too long, and may be too short, although it is unusual to see one too short.

"When a doubletree is too long, the center of draught between the animals will be too far from the furrow on the side of the unplowed ground, which will cause the plow to cut a furrow slice so wide that the mold board will not turn it properly.

"The plowman is forced, therefore, to adjust the clevis so that the implement will incline toward the furrow. Such an adjustment of the clevis causes the implement to run so unnaturally, that the moment the plowman does not hold the plow up to the desired position, it will turn up out of the ground and fall over on its side."

General Defects in Plows.—"One serious fault to most plows is the proper dip to the point. It is hard to tell on paper how to run a plow, yet it is easy for an experienced plowman, even when blindfolded, to tell by the touch when the plow runs right or wrong, and what should be done to make it run without holding.

"The draught chains must be neither too long nor too short. The clevis must be correctly adjusted. The doubletree must be neither too long nor too short. The beam must stand in proper line with the face of landslide—the dip of point must be just right and every part must be correctly balanced, and then a boy will be able to plow about as well as a man.

"Defective plowing is generally caused not from want of muscle, but want of knowledge how to adjust the implement."

Leverage in Plow Handles.—It is claimed that in a well constructed plow the leverage is the same in both right and left handle. "Force applied to one handle is equally applied to the other, because they are connected together, and are both component parts of a guiding attachment, neither one having any independent office or power.

"The left, or landside handle is, or should be, bent out over the land and away from the plowman, and the right one is brought up so near a line that when he walks in the furrow they are equally distant from him. Thus all is balanced, all is equal, and it makes no kind of difference whether the left or the right hand of the plowman is stronger, nor to which handle the lines are attached."

Some claim that it requires not more than half the labor to steady the plow and govern it with the mold board handle, that is required when using the beam handle. Whether it be a right or left hand plow used, the mold board handle is the one by which the plow is the easiest governed. The difference of opinion may be owing to different adjustments.

Economy of Long Furrows.—A German agricultural journal observes that farmers usually pay little attention to the length of the furrows to

be plowed in a field, and yet great waste of time and labor is the necessary consequence of unsuitable arrangements in this respect.

The turning of the plow and the commencing of a new furrow requires more exertion in the plowman and the team than continued work in a straight line, and how great may really be the loss of time from frequent interruptions in short turns, may be shown by the following calculations :

In a field two hundred and twenty-five feet long, five and one half hours out of ten are used redirecting the plow ; with a length of five hundred and seventy-five feet, four hours are sufficient for the purpose ; and when the plow can proceed without interruption for eight hundred feet, only one and one half hours of the daily working time are consumed. Hence the economy in making the furrows as long as circumstances will admit.

How to Plow Flat Land.—A veteran agriculturist writes the author of this work of a system of plowing he has adopted and tested for years, which he calls an excellent substitute for underdraining.

The system consists in plowing the land so as to never fill up the heart furrows. Before plowing in this way the first time, observe which way the field will drain to the best advantage ; then measure off the lands about three rods wide. It is necessary that the lands be laid out regularly, and the furrows be made straight, for when once opened they are always to remain so.

The next time the piece is plowed, plow up the same way, or back furrow, opening the same furrows as deeply as possible, as continuing to plow the same way would throw all the fertile soil away from the furrows, and make the centers of the lands too high. After the second plowing pass along the heart furrows and plow two furrows toward each land ; with a large plow and a strong team once will be sufficient. Then plow the lands back toward the furrows. This will leave a light furrow in the center, which will fill up in harrowing.

In plowing after this, plow either from or toward the furrows, as the land may require, taking care to leave the lands highest in the center, so that the water will flow toward the furrows. At their lower end, the furrows should be opened into an open ditch, to carry away the surface water. By opening the furrows as deeply as possible at each plowing, the land is as effectually drained as though tiles had been laid at a depth of two feet.

The deep furrows produced can be no objection to the system, as the wagon, mower or reaper will cross them easier than the short, abrupt furrows made in the old way. In using the drill, drive crosswise of the furrows.

Back Furrow Plowing.—A Western grain grower says that if you wish to plow a land ten rods wide, instead of striking out a land that width, take one-half that width, pace off five rods from the end, and set in your plow, and plow to within five rods of the other end and stop ; now back furrow as usual the required length, and then turn a square corner at the end, observing

to have the end furrow on a parallel line with the outside. By this means you will always turn round on the stubble, thus leaving the land untrodden, and instead of dead furrows at the corners, you will have ridges.

Care of the Plow.—When the plow leaves the field, the mold board is polished bright, but will not remain so long unless coated with oil to protect it from the influences of the weather. It is an easy matter to brush it over, as it is put away, with an oiled rag or any one of the preparations recommended in this work to keep iron and steel from rusting, and when new work is begun with the plow, the advantage will readily be seen.

MANAGING LARGE SAWS.

To Set a Cross Cut Saw.—It has been my custom to use a good iron wedge to govern the slant of the large saw tooth. First I make the two straight sides level, then bevel one corner or edge of a straight side at the head end until it is of proper pitch for the set of a tooth. The blade of the saw is laid flat upon the side of the wedge, an assistant holding it, and each tooth to be set on one side brought over the beveled surface, and by a hammer bent down to fit the iron.

The left hand is placed upon the blade at the back to hold it firmly upon the wedge, the tooth brought so that the point just reaches the wedge head surface, and then the blow struck. Pass over both sides, keeping one position all of the time. When one side is done, change ends with the saw and go through exactly as at first.

There are better foundations upon which to set a cross cut saw, perhaps, when one is at home, but the advantage of the wedge is in being able to set the saw in forest or field, in case it has been pinched by the settling of a large log, which is not unfrequently the case. By a uniform use of the wedge one becomes more efficient in handling it. By placing the wedge on the surface of a large stump, one has a good, solid foundation to work upon.

Drag Teeth of a Saw.—It will be found an advantage to leave now and then a straight tooth in the saw to drag or rake out the chips. I mean by this a tooth not set or bent in either direction. Some leave every third, others every fourth or fifth tooth as a drag. When the saw is filed, the scrape teeth should be dressed square across, and left about one-twentieth of an inch shorter than the beveled and set teeth. This can be determined by use of a straight edge.

How to Joint a Cross Cut Saw.—An important requisite for successfully working a saw is to have a true cutting surface; that is, a surface so

adjusted that the point of each beveled tooth will cut exactly in the same line, causing the saw to run smoothly, silently almost, and rapidly. This adjustment of teeth is accomplished by jointing the saw.

Dress out two boards, about three-quarters of an inch thick, and as long as the cutting portion of the saw. Make one edge of each board to conform to the curve of the blade; that is, the general rounding plane of the teeth points. This circular edge should be dressed up true and square with a jointer. Two pieces should be held together by means of four small bolts passing between the teeth. Place the saw between these two jaw boards, so that the points of the shortest teeth will be barely even with the squared edge, screw them up tight, and with a large file joint off the longer teeth even with the shortest ones, by running the file flat side down lengthwise of the saw, as shown for small blade on page 24. Now the saw is in proper condition for setting, if it needs it, or for filing, which will, of course, always be necessary.

To File a Cross Cut Saw.—The same clamps that are used for jointing may be used for filing, by removing the bolts and lowering the boards down and screwing them in a vise. Every third, at least every fifth, tooth should be left straight, as before suggested, which acts as a scraper, after the beveled teeth have done the cutting.

Care should be taken that the point of any one tooth may not be filed more than those on each side of it; as a short tooth, whether it be dull or sharp, may as well be entirely removed from the saw, so far as cutting is concerned, as to remain.

Do not file the first side quite up to the points, then turn and file the other side, then turn back and finish the first side—if necessary, turn again and finish the second side. But if a saw is not dull, three times filing across is sufficient. After a saw is filed, round off the last tooth at the point; this will prevent this tooth catching in the kerf as the hand is drawn clear back and at the instant of starting it forward. It will also lessen the danger of bending or breaking.

It is a good plan to take a file along when going to the woods for a full day's sawing, as the tool by use will become dulled as well as any other. It is sometimes necessary to run the saw into the earth to get through a bedded log, and the saw is badly dulled by contact with gravel or larger stones. To file the saw away from the shop, saw down near the width of the narrowest part of the blade into the edge of a stump, invert the saw, set it into the kerf, put in a thin wedge, sharpen up both ends, then cut the kerf deeper and sharpen the belly or middle of the saw.

Grease for a Cross Cut Saw.—I have found the best results from using animal oil that will not harden. Tallow hardens by coming in contact with metal and the damp interior of the log and soon disappears. The oil of small shack eating animals will lubricate the blade into free action for a long time.

Handles for Cross Cut Saws.—It is the practice of some to use the crotch handle in the cross cut saw. The handle is worked out like an inverted letter V, excepting that one part should stand perpendicular, and the other slant, when in the saw. There is no particular advantage in it when the saw is in the upper part of the log, but when the blade is running low the crotch handle saves stooping and muscle. Each part of the handle should be about the length of the ordinary saw handle. It should be of good timber, well seasoned, and, of course, worked out so as to be smooth to the touch.

Cross Cut Saw Guide.—There are but few who can run a saw truly down through a log even of small size if guided only by the eye. In sawing large logs there is always a disadvantage in getting convex and concave ends, when pinching takes place. To obviate this make a guide to work by. Get the hoop of a hogshead if the tree to be cut up is large, or a barrel hoop if of medium size, and after scarifying the log, put the hoop over and fasten it in place by a few nails. The saw can easily be run down by the edge of this, and the log end be made true.

To Sharpen Circular Saws.—Put the saw in motion and hold a flat, fine file against the teeth, until they are of equal length. Next take a steel pen dipped in ink, and as the saw revolves, apply it at the base of the deepest tooth, so as to make a circle upon the saw plate. Remove the saw and simply screw it up in the bench vise and file it between two boards of circular or other shape. As you have a guide line, you cannot get the saw out of round.

Circular saws need little setting if they are to be used only on hard or perfectly dry stuff.

Filing the Mill Saw.—One great trouble in filing a mill saw arises from rounding the surface of the tooth edge, by carrying the file with an unsteady hand. Usually there is too much pressure upon the small end of the file, which causes it to dip as the leverage increases.

The *American Agriculturist* furnishes some excellent suggestions on position, which I quote: "The end of the file should be taken lightly between the thumb and fore-finger, as fig. 1. There is no uneven pressure in this case, and

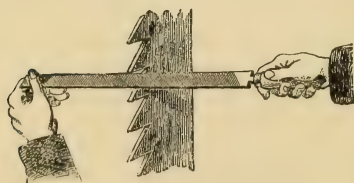


FIG. 1. UPPER SIDE FILING.

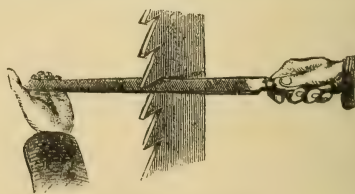


FIG. 2. UNDER SIDE FILING.

the direction of the file may easily be kept perfectly level. In filing the base of the tooth, or the under portion of any work which cannot be turned over, the end of the files should be supported upon the ends of the fingers, as fig. 2,

or be held by the end of the thumb, in an easy, gentle manner. If held lightly, and not grasped too firmly, the arm or wrist will not be tired so soon as when it is held rigidly; and the motion of the file will be more even and regular."

Some mill owners file their saw teeth a little beveling, holding the tool at an angle of about ten degrees on the bottom of the tooth, and square or flat on the top, changing sides, or hands, every alternate tooth; then bending or setting the tooth, point outwards, sufficient to keep the saw clear. This mode obviates, it is claimed, the necessity of swagging, which is a great saving in time and labor.

A writer in the *Scientific American*, who has had long experience in a mill, says that it takes more power to run a saw filed in that way, because if a tooth is filed on angle it has a longer cutting edge than when filed straight across. When filing square the file is held constantly in one position, and after a little practice it is easier to see when it is at right angles with the saw.

He sways the teeth so they need but very little set; and to get that he springs the tooth near the plate of the saw to gain all the strength of the tooth, and sets it to a gauge on each side. When he starts the saw it always points straight ahead, the tooth being swagged makes it wider at the point, and the saw always runs perfectly free, and if it dodges in striking a hard knot, the corners being sharp, on the opposite side, it will work its way into line immediately instead of crowding further off.

In running saws in this way he has less trouble, and makes more and better lumber than those who file their saws beveling, he claims.

FARM FENCING.

Fencing with Rails.—Forest trees have died off so rapidly for the past few years in the timbered sections, and farmers have been so lavish in the use of timber, that the question is now being asked, what are we to do for fencing material? The question is one of importance, and the answer should be: the exercise of economy in the future.

Hickory and ash should be used only for rails; oak and chestnut for posts; beech maple and other hard timber that will not easily split, for fence boards. Upon many farms, rails hereafter can only be used for cross fences, posts and boards taking their places when lines are permanently fixed.

Rods of Fence per Acre.—By use of figures and the change of field divisions, there may be a great saving made in rails, and yet good fences be sustained. To fence a farm into fifty-acre lots, crediting one-half of the fence to the adjoining field, it will require from three and a half to four and a half rods

per acre; the variation being in accordance with the shape of the fields. If long and narrow, more rails are required than if square.

If the same farm was divided into twenty-five acre lots, about five rods of fence would be required per acre. Ten acre lots would demand eight rods, and five acre lots eleven rods per acre.

Cheap Rail Fence.—Where small timber is abundant and there is a scarcity of large, a cheap fence may be made by laying a worm with little crook four rails high, then putting on two halves of poles; these placed on the edge to give greater height to the fence. Two stakes at each angle are driven into the ground, spreading some at the bottom to give strength to the fence, and are held by a wire. The top rail may be simply a light quarter pole supported by the wire.

Preparing for Fence Building.—Rail cuts should be drawn out to the place where the fence is to be built or repaired, in winter time, while the sled can be used, and split there. This method will save a great deal of handling.

How to Split Rails.—Almost any farmer can split rails, but there is considerable science in the work after all. One man will rive them out with apparent ease, while another will tug away and exhaust his strength in a few hours. The reason of this difference is owing to the weight and shape of tools and the knowledge of their use. One man makes a constant outlay of strength, while another will apply it only at an essential point, and that is when the beetle is descending and near the wedge.

The Maul and Wedge.—The best maul is made of a knot, and should be of medium weight, not so heavy but that a man can swing it with ease. One iron wedge, quite slim, should be kept and used for starting the split; it is not apt to rebound, and if it should, it may be easily prevented by making a few checks with an ax near together, and starting the wedge between them, or by rubbing the wedge in dirt.

Best Timber for a Maul.—For a good farm beetle no better material can be used than the knot of a tree. Hickory and white oak usually make the most durable mauls, but often those made of beech, maple or white ash are found to wear well. In selecting a knot, one should be taken that has grown upon or near the root of the tree, for the higher up they appear the more spalt and tender they will be found.

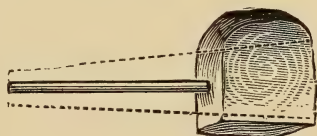
How to Make a Maul.—To make a good beetle, the knot should be cut at least one year before used, and seasoned in the shade in just the shape it came from the tree. If worked out green, it is liable to check, and wherever a check is found upon a maul head a marked difference will be seen in the wear of that immediate locality.

When the knot is seasoned, bore an inch and one-fourth auger hole as directly through the center as possible from the in, or wood side, to the out or

bark side ; then fit in the handle and trim up the head by it. Ten inches broad and eight inches deep is a very good size for a beetle, but some prefer heavier and others lighter.

No more power can be applied to a heavy instrument than to one of medium weight when driving a wedge, and the labor is much more fatiguing to the one that swings the former. The only advantage is, that a large beetle head will wear longer than a small one.

To make the beetle hang true, a straight edge must be used. Work off the sides so that when the straight edge is laid upon it, about same space will be found between the end of the handle and the straight edge that there is at the point where the handle enters the head. After this any desired shape may be given to the beetle, the only thing to be observed will be taking a uniform amount from all sides, as shown in engraving.



WAY TO LAY OUT A BEETLE.

Care of a Beetle.—A maul to wear well should be kept dry. Once getting thoroughly wet, if used at all before drying, will do more harm than pounding a thousand rails under ordinary circumstances. When the earth is wet the beetle should not be set upon the ground when out splitting rails, for a very little dampness causes the grains of wood to soften, and when beat upon they will rise up and flake off.

For a beetle handle nothing is better than a good stick of second growth hickory ; work it out smooth and do not make it too long.

Blasting Rail Cuts.—By the blasting process, a dime's worth of powder will, many times, save a half day's hard labor, besides the wear of the beetle. The bursting of logs with powder is a simple process, and is quickly done.

Bore with an inch and a half auger a hole in the top of the log, about midway from end to end, and as deep as possible without striking the seams or heart checks—this can be determined by examining the ends—then put in about one-fourth of a pound of coarse cannon powder, if a large log, less for smaller, then set in at one side of the auger hole a wheat straw, filled with rifle powder, so that the latter connects with the former.

The straw should be long enough to project out of the hole one inch or more. Now partly fill the hole with fine sand that is *perfectly dry*, and tamp it down thoroughly with a stick and mallet, repeating two or three times until entirely filled, then lay a few shavings or other light combustible matter around the fuse, set fire to it and withdraw to a safe distance, leaving the log from the

end, and keeping that line, as this will avert danger in case of a sudden explosion.

Stakes for a Fence.—If good, free splitting timber is not plenty, get them sawed two and a half inches square, but use nothing but durable timber. Make the stakes two feet longer than would be necessary if they were to last forever; and then when decay has begun at the surface of the ground, (the place where it will appear), drive these down a few inches. In this way one set of stakes may be made to do service for very many years.

Relaying Old Fence.—I do not believe in mixing new and old rails together when repairing, but with new corner blocks, and one new rail at the bottom, old material may be made to last many years. An old fence that will furnish six passable rails to the length may be made by using new material as above suggested, serviceable for years as a protection to crops.

Hillside Fencing.—When fencing a hillside with rails, begin to lay the worm at the bottom of the decline and work up. In this way the lower end of the rail comes on top of the one further down, making it nearer a level than if laying the fence down hill, for in the latter case the lower end will come on the block and be the under rail at the lower end.

Economy in Fencing.—A correspondent has figured out the matter of fencing in the most economical manner, and has decided that the board and post fence is cheapest, save in sections where timber is abundant. He says:

“We will estimate the square measurement of a common rail at fourteen feet, and fourteen rails to the rod; we have 196 feet of timber; allowing four stakes to the rod measuring twenty-eight feet, and we have two hundred and twenty-four feet of lumber to the rod, and at two and a half cents per foot, a cost of \$5.60, and this rod of rail fence will occupy about seven feet of ground.

“For a board fence, allowing five boards in height, cap on top and battens, we have fifty-four and a half feet of lumber per rod, and at an estimate of two and a half cents per foot, or \$25 per thousand, and two cedar posts at thirty cents each, we have an expense per rod of \$1.96. Add to this one and one-fourth pounds of nails at six cents per pound, and we have the sum total for one rod of board fence \$2.08.

“I think the difference in cost of constructing the two fences to be in favor of the latter, when we consider the superior durability of the board fence and the saving of land occupied. My experience with line fences has been very limited, yet I believe the most approved method of setting osage orange hedge is to plant them zig zag, six inches each way. It will take sixty-four plants to set sixteen feet, which, at five cents per plant, will cost \$3.20. Allowing the expense of setting to offset the constructing of the other fences mentioned, and we have the following result:

“Rail fence per rod, \$5.60; board fence per rod, \$2.08; a difference between the two of \$3.52 per rod, while the hedge fence costs \$3.20, a difference in favor

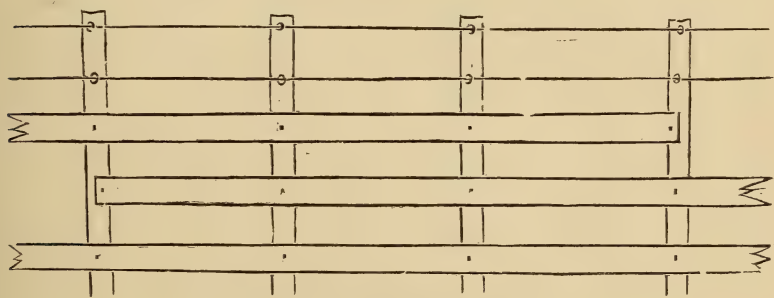
of the last over the rail of \$2.40, and a difference between hedge and board fence of \$1.12 in favor of the board fence.

"Men who have given the living fence the most attention, claim that hedges destroy the fertility of the soil as far as the roots extend, which is a considerable distance. It is a fact that all trees and bushes are gross feeders upon the land."

The Hurdle Fence.—For cross fences, especially between meadows or pastures where the division lines are likely to be changed, the hurdle fence is probably the most economical. It should be so made that when set up it will be straight like the board fence, but capable of being taken down and removed with much greater ease than one made of rails, and which will furthermore preserve its upright position against the stress of ordinary winds.

The hurdle, or light movable fence, is variously formed, of boards, wire or wicker work, in short panels, and firmly held to the ground by sharpened stakes at the end of each panel, and these are fastened together. It is a convenient appendage to farms, where heavy green crops of clover, lucerne, peas, turnips, etc., are required to be fed off in successive lots, by sheep, swine or cattle. A hurdle fence may be made after the plan given on pages 65 and 66.

Straight Rail Fence.—Where rails are scarce, and a permanent fence is to be constructed, a very good plan has been adopted by some farmers of back furrowing a ridge four feet wide upon the fence line, then setting stakes in pairs ten feet apart, and laying rails between them, the stakes being held by caps, pins, or wires at the top. The advantage of the back furrow is, it elevates the fence base so that fewer rails are required, and, again, animals cannot get against it to push or jump. Where hedges are desired, the soil is prepared for setting the plants by the process named.

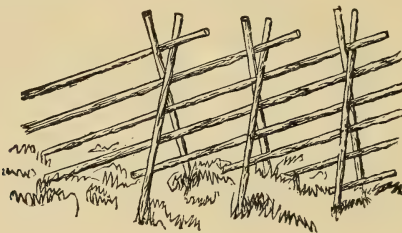


FARM FENCE OF BOARD AND WIRE.

Board and Wire Fence.—A fence made of boards and wires answers a very good purpose on a farm, especially where it is necessary to pay a high price for lumber. Three boards, six inches wide, and two wires will make a fence nearly five feet high and secure against both small and large animals.

Put first board three or four inches from the ground, then the other two with four inch space between them, then above top board ten inches put a wire, and thirteen inches above that the second wire. If it is desirable to have the fence higher, another wire may be added, and the distance between the three wires lessened.

The Pole Fence.—A very good, cheap and secure fence may be made from poles, either whole, halved or quartered. After building up at the starting point to the height desired, one set of stakes will be required for each pole



EASILY CONSTRUCTED POLE FENCE.

added, as shown in the illustration. As there is but little contact of separate pieces of timber, decay cannot be rapid, even if the most inferior species of timber are used.

Another style for making pole fence is, to lay a line of poles upon high blocks, then cross stakes, and lay in other poles until the desired height is reached. This fence is only suitable for large stock.

How to Make a Brush Fence.—Drive stakes on the line where the fence is to be built every three or four feet. They may be of old material or poles. Have the same six feet long before driving, and sink them a foot or more with a maul. This had better be done when the ground is wet. The brush may be cut from swamp or forest, or the toppings of a hedge used, which is better than any. Build up at the starting point, then set the brush, heeled in, at an angle of forty-five degrees, and keep that angle all the way, making no change when passing stakes. Straddle the stakes with cross laps and brading, and carry to the desired height. By topping once in three years a brush fence will last a long time.

To Make a Thick Hedge.—After preparing the line by back furrowing, and fertilizing if the land is worn, plant eight inches apart. Cultivate well for three years, plow a deep furrow two and a half or three feet from the hedge with landside of plow next the hedge; and have two men, one with a shovel, the other with thick boots, to bend (not cut) the hedge and tramp it to a horizontal position, or level with the ground diagonally with the line of hedge.

Tramp the tops in the furrow, and throw dirt on them to hold them in position, leaving two and a half or three feet of the base uncovered. Thus treated,

they will send up from ten to twenty vigorous sprouts from each plant. This being done in spring, in the latter part of June clip it within six inches of base of sprouts.

The September following clip it six inches higher, and continue the clipping semi-annually until your hedge gets the desired height, and it will be two or three feet thick at base, and impassable to man or beast. So says an old experienced Western hedge grower.

Planting the Osage Hedge.—A hedge grower of extensive experience says that for planting, if your land is in turf, plow deep and subsoil a strip six feet in width, and plant with potatoes the spring previous. Just before planting the hedge, plow again and harrow fine, then stake off the ground by setting a requisite number of sight stakes in line where you want the outside row; then prepare a line, say fifty or more feet in length, by tying on it bits of colored yarn twice the distance apart you want your plants; tie each end of the line to sharpened stakes two feet in length; stretch the line in row with your sight stakes, and you are ready for operations.

Two years old plants are preferable, unless the yearlings are very vigorous; trim to eight or nine inches long, cutting off the tops within one inch of the yellow. Set two rows, and the plants eighteen inches apart in each row, the rows nine inches apart. Dig the first hole by the mark on the line, set in the plant and fill around it with earth taken from where the next plant will stand, which will be half way between the plant just set and the next mark on the line, but nine inches from the line. This being set, fill around it with earth taken from where the next plant will stand at the second mark on the line, and so continue until the line is set.

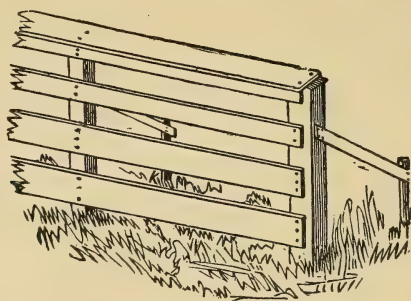
Take up the stake where you commenced, letting the one stand where you left off, and place as at the first; then tread the earth firmly about the plants by slowly walking the length of one row, the plants being between your feet, and if you see a plant that does not stand square, now is the time to right it up into proper position.

After you have trod both rows in this manner, take your spade and finish the planting by filling around the plants till the tops only are seen. This dressing should be left without treading. Your hedge is now well planted, and a quick workman will plant sixty rods in a day, the plants being furnished and distributed on the ground.

To Trim Osage Hedge.—The next spring cut down to within three inches of the ground; and in June, if the hedge has made good growth, cut to within four inches of the previous trimming, and so continue until the hedge is completed.

A hedge planted and trimmed after the plan given, instead of being open at the bottom, will be very dense, and will turn swine or other small animals at a very early age.

Farm Board Fences and Gates.—Board fences and gates on the farm are yearly coming more and more into use. As to different styles, manner of construction, making most durable, etc., the subject will be found very fully treated on pages 59 to 72.



BRACE FENCE FOR MARSHES.

Fence for Marshy Land.—In marshes, where there is liable to be an overflow at times of heavy rains, a board fence may be constructed, and then braced from the lower side, as shown in the illustration.

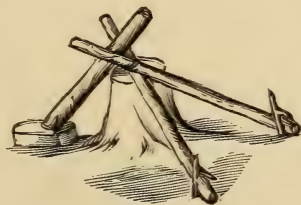
A few feet from the fence posts drive down solid stakes, allowing them to extend above the surface of the ground about a foot, and then spike braces from these to the fence posts, at a point near the top of the latter. A fence thus built will withstand the pressure of quite heavy floods of water, such as would sweep away a common post and board fence.

A Farm Hitching Post.—The post should be dressed down from the body of a tree, white oak or chestnut, leaving that part that goes into the ground full size. Plane the post smooth, so that it may be painted. Plate the top with tin or sheet iron after it has been rounded, and provide with ring and chain. The chain should be five feet long, with a snap on each end. Fasten the chain to the post by a staple, one-third the way from one end of the chain to the other. The short end of the chain will serve for a single horse or the nearest horse in a team, and the long end will be right for the horse furthest from the post. Put two such posts six or eight feet apart, and make a platform between them from which to get into wagons, with steps to ascend to the platform from the sidewalk, and you have a very desirable accompaniment to a well appointed home.

To Lift Posts Out of Ground.—By the use of a team, posts that are firmly set may be raised out of the ground with comparative ease. The chain should be a long one, and stout enough for the work. The chain is put around the post at the base and a stout prop put under it a few feet away and inclined toward the post, after the manner described under head of stump pulling; then let the team draw. There are very few posts so tight in the ground that

they cannot be drawn up by the simple process. In this way a long line of fence may be removed in a single day. The shape of fields is sometimes greatly improved by a change in the boundary fences, and lanes and cattle yards rendered much more convenient where a removal of the lines can be made.

To Straighten Up Posts.—Do not neglect to straighten up fence posts while the ground is soft; brace them up, and do not remove the props until the ground has settled. It is almost impossible to straighten up a board fence at any other time than spring.



CROSS-RAIL POST HOLDER.

Holder for Post Sharpening.—A device for holding posts while they are being sharpened may be quickly prepared by crossing two rails and pinning them or binding so as to form a crotch, as shown in engraving. The rails may be supported just back of the cross by any convenient object. The lower ends of the rails should be held fast by driving a stake with prongs down, or by spilling the stakes to the rails.

In place of the rails scantling may be used, or a small tree cut with a crotched end, and supported by a small stump or two other crotches, set bracing backward. By a bit of trace chain the post may be held in place. A shoulder block should be used to hew upon.

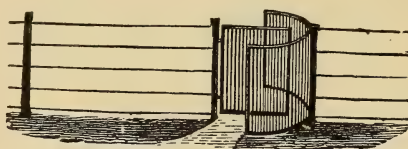
How to Use Rotted Off Posts.—Saw off as much of the adhering decayed wood as it may be necessary to remove in order to get a solid bearing, and squarely across one of the flat sides of the post, about four inches from the end thus cleft, saw to the depth of about three-quarters of an inch. The piece thus partially separated cut out with a hatchet, making what is sometimes called a half mortise. Nail into this a piece of inch oak board, six inches wide and about three and a half feet long, so as to project equally on each side of the post.

The whole, when set upright, rests upon the edge of the inch board, and is in shape like the inverted letter T. Set in between two sound posts in a line of fence, the repaired one stands well, since it cannot lean laterally because the ends of the cross board project on each side of the line.

In setting, should the surface be uneven, the placing or removal of a little earth suffices to level the base.

Permanent Gate Posts.—A farmer recommends the plan of leaving trees, when clearing up land, at such points as gates will likely be needed. He says that a thrifty tree is the best support against which to hang a gate, as it will not sag, like a gate post artificially set in the ground, and so liable to get out of order. Besides, the “tree by the gate” is an ornament in the field, and will make an acceptable shade to the patient cows which are waiting to be taken home.

Trees of quick growth may be planted where wanted in cleared fields, and but few years will pass before they will be large enough for use. It is not advisable to put the common locusts into the fields on account of spreading so. The white willow will answer, perhaps.



FARM GARDEN SAFETY GATE.

Farmer's Garden Gate.—At the time when the garden products have matured and are of most value, it very frequently occurs that the farmer desires to feed off his meadow or house lot adjoining the garden, and the gate becomes an object of anxiety. Fear is entertained that it will be left open or forced open by the live stock.

A gate constructed after the manner of the one shown in the engraving obviates all trouble. While a man can pass without difficulty, it will be impossible for a cow or sheep to do so. The curve should be so narrow at the ends that the gate in turning to right or left will strike the curve a little distance from the ends, and of course that stops further progress. The distance between end of gate and center of curve should be just sufficient to let a person pass.

Bars Upon the Farm.—A thorough-going, forehanded farmer will never have but few bars upon the premises, for experience will soon teach that gates are much more convenient, safer against the ingenuity of unruly stock, and are not liable to make horses breachy.

The farmer who is in the habit of letting down the corner of his fences here and there, for passing from one field to another, will never have a definite road laid out, and never have his fences in good order. A corner cannot be put down and up again, even once, without racking the fence, and when the operation is performed several times, the structure becomes an insufficient protection to crops. Then I say bars are an improvement, but in saying this I would by no means commend them for general use.

Among the objections to bars may be mentioned, first: They consume a great deal of time in handling; second, horses are very liable to get into bad

habits by being made to leap over the bars after being partly let down at one end—this is fun for the boys, but is a serious misfortune to the owner of the animal; third, swine and cattle will often learn to push the sections, and pass into another field at will; fourth, animals are subject to injury when passing over the bars let down, by getting their legs between the sections.

To prevent the bars being shoved by animals, have a shoulder at the drop end, and the tenon reach through the post, so as to take a small pin horizontally. These pins may be of hickory, and fastened to the post by a short cord or small chain, so as to save holding or dropping them to the ground when removed.

Timber for Bars.—Basswood, red elm, and white ash are the best timber for the bars. They should be an inch and a quarter thick, and six or seven inches wide. Before making the bars, pile the lumber straight, and let it season sufficiently to retain a straight position. Crooked bars are unsightly things, and will be an eyesore to any farmer of taste.

To Make Bars.—Dress the bars with a plane, and round both lower and upper edges with a light draw shave, so that they will be smooth to handle. A coat of paint will add both to appearance and utility.

HOW TO BUILD A WIRE FENCE.

Fence for Large Stock.—Upon this subject I cannot do better than to give a letter written by a prairie agriculturist, who has had a ripe experience in wire fence making:

I built two miles by driving posts eight feet apart. I put on four wires (No. 8) with staples, and strained up with rollers against the post, and thought I had a good fence. The next spring I built one mile, posts sixteen feet apart, wire put on with staples, but the staples pulled out.

I built another mile, five wires, posts twenty feet apart, wire put through three-fourth inch holes bored in the posts, and stays put on with staples. The stays were eight feet apart; then No. 16 soft wire put on for another stay, making the stays every four feet.

I strained the wire with two inch oak pins, put in a heavy flat post, with the hole mortised in square two inches, to hold the head of the pin, which is made square and turned with a monkey-wrench to tighten the wires.

This made a good fence and the best I had built. No cattle have been through it. It is with difficulty that a man can get through.

Wire Fence for Sheep.—I have fenced a pasture to keep sheep in, which never were stopped by fence before, and this fence I call a good one, and I will tell how to make it. Set the corner post three feet in the ground,

with a two inch oak pin through near the bottom, two feet long, then put heavy stones on the pin, and fill the hole up with stones. This is to keep it from pulling up, which it will do if not well secured. This post must be braced.

Have good, straight, strong posts ; set them thirty-two feet apart. After setting, (which we do by sharpening and driving with a sixteen-pound sledge, putting them down two feet at least,) bore the holes with a three-fourth inch bit to run the wire through.

Five wires should be put on, for cattle, eight inches apart ; and seven wires six inches apart—except the top one, which may be eight inches—for sheep. Use No. 8 wire for at least half the upper part of the fence, and still better if all used is No. 8.

How to Wire.—Commence at the first post from the corner post to put the wire through the holes. Unroll the wire, which is best done by putting a coil on a roll made for the purpose ; run the wire all off, then fasten the end to the corner post. Put on all the wires in a similar manner before moving on, then move on to the end of the wires unrolled and unroll another, splicing each time as they run off.

How to Splice.—The splicing should be done by lapping the two ends ten inches and twisting together, and looping the ends back so as not to draw through. This makes a splice that will pass through the holes.

Tightening the Wire.—Put on about forty rods in length, then take a strong “hand-spike” and loop a wire around it, and have two men strain the wire tight enough to take all the kinks out. This is done by sticking one end of the lever in the ground.

How to Make a Strainer.—When all are strained, put on the “strain-ers” at the end of each wire. This “strainer” is my own invention, not yet patented. It is made of No. 8 inch wire, in this way :

Take a piece of good wire three feet long, bend it around so the ends lap two inches ; twist them well together and loop the ends back ; flatten down the two strands so as to be three inches apart ; take each end in your hands and bend the center over a two inch round stick until the two ends come together. This makes a sort of clevis. Then make a two inch hardwood pin, ten inches long, with one end shaped to put a monkey wrench on to turn it.

Bore a small hole in the middle, to put one end of the wire through to fasten the wire to the pin ; then bore a three-fourth inch hole, one and one-half inches from this, to put a stick in a foot long. This is to keep the pin from turning back when strained up.

The stick must be lashed to the wire. Now splice one strand of the fence wire on the wire strainer, put the two inch pin through the two loops in the other end, and commence unrolling wire as before, and connect the end to the pin by running it through the little hole, bending the wire around the pin.

This strainer will strain from both ways as tight as is necessary—you can

strain eighty rods, if the ground is level. When the wires are all on, strain up by turning the pins, which serve as rollers, with a wrench.

The Key Wire Stretcher.—Another writer upon the subject of tightening wire, says that among all the contrivances he has met with and tested, no device does he consider as good as the principle by which a violinist applies the tension to the strings of his instrument. It is simple, cheap and efficacious. No machinery (except some pieces of half inch round iron to answer for the screws, and a short iron bar) is necessary.

Brace the posts at the extreme ends of the trellis firmly ; secure the wire to the further one by a staple driven round and against it, or by lapping it twice around the post and then about itself. Then lift the wire to the proper height at each post, and support it by a staple, driven in.

The irons or screws to which the wires are to be fastened (they are called screws, though they have no threads) are to be fitted tightly in their places, so that the tension will not turn them back. One end should be doubled over by the blacksmith, so that when in place, a short bar of one inch iron can be inserted by which to apply the tension.

Just outside the post the screw should be pierced sufficiently to admit the passage of the trellis wire through it ; this can be fastened by winding it around the screw once or twice and then over the wire itself a few inches, and then the tension can be applied. The wire winds upon the iron key or screw to which it is fastened precisely after the manner of a violin string, and is kept at the desired tension on the same principle.

As winter approaches the tensions may be lessened a little, if any danger is apprehended from contraction. It can be regulated in almost a moment, and without hard work or any other machinery than the bar, and there is no limit to the power which may be applied, except the strength of the wire, or of the braces which keep the end posts in position. One man can put up the wires, and the trellis may be of almost any length. As only one set (four) screws are needed to a row, the longer the rows the less the cost for this item of trellising.

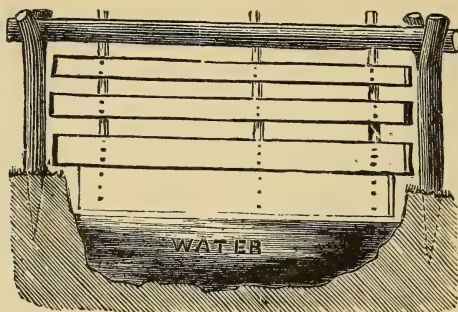
Putting on the Stays.—When well strained, which is one of the important things in a wire fence, put on the stays with staples eight feet apart, drive the second staple from the top and bottom wire tight up on the wire, leave the rest a little loose so the wire will slip through. Next put on No. 16 annealed wire for additional stays, which will make them four feet apart. If the work is well done you will have a good wire fence.

Things to be Observed.—Two things are necessary. Have the corner posts firm and well braced, and the wires strained tight.

Now as to the advantage of putting the posts so far apart. It takes so many less posts, and the fence sways a little when a horse or other animal comes against it, and again springs back. The stays should not touch the ground to prevent its coming back, Make the fence four feet high,

CONSTRUCTING FLOOD GATES.

Crotch and Pole Flood Gate.—One very seldom sees a flood gate that will stand a heavy freshet. A pole that will turn in a couple of crotches



OLD STYLE FLOOD GATE.

with a few boards attached is the usual form of construction, and they need building over every year to make them at all secure. This is poor economy. They should be so built at first so as to last for a long period, and be a safeguard all the time.

Flood Gate Piers.—These should be made of stone cemented together, or of log cribs well locked and filled with stone. They should be made large, considerably higher than the stream ever rises, and have their foundations so far beneath the surface as to prevent heaving by frost or undermining by floods. This will cause a slightly greater expense, but when properly constructed they will not need repairing every year.

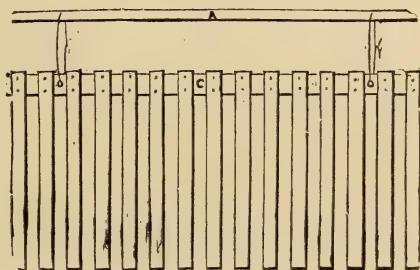
The Cross Pole.—Resting on secure cribs, across the stream is placed a large pole eight or ten inches through, to which the gate is attached. This pole should rest on gudgeons, which should be blocks of hard wood. A staple should pass over the pole ends, firmly fastening them to the piers, but allowing the gate to turn very easily.

Making the Sweep.—As for the gate, but few are rightly constructed. Most builders appear to think the greater space they leave the better, while the reverse is the fact. Suppose the gate is constructed of six strips four inches apart; when the flood swings the gate before it, it swings all the edges of those strips against it, which, if they are an inch thick, gives six inches of surface against which the entire force of water is expended, which is sufficient, if the gate is weak in any part, to break and bear it away. On the contrary the gate should be boarded tight—not a crack left—so that the force of the water will be expended in turning it, or rather simply holding it up while the flood passes.

The Hinge Gate.—If one prefers, the cross pole may be made solid by

pinning to the crib, and the gate hung by stout iron hinges. The only advantage in this is, the gate may be removed for repairs if ever damaged, but the necessity of removing is hardly probable.

The Slat Flood Gate.—A gate made with perpendicular slats has been used by some with tolerably good results. The pole or scantling to which the slats are attached should have a broad, flat surface, so that each slat may have two heavy nails or spikes driven a few inches apart for bracing support. The illustration will give a clear idea of its construction.



CHEAP SLAT FLOOD GATE.

With this gate there are no water resisting edges of boards, and no chance for lodgment of ice or fine flood trash. Each slat stands independent like a tooth of a revolving horse rake, and repairs cannot at any time be very extensive.



THE CHOPPING AX.

Selecting an Ax.—In selecting an ax, weight and quality are important points to be observed, but no more so than proportion. Look to it that the poll or head is neither too heavy nor too light for the bit, for with either defect the ax will always be out of balance. Not unfrequently have I seen axes with far too much bit, and the consequence was wobbling when swinging in the air, and descending with uncertain stroke. With an ax out of balance by use, a remedy may be found in filling the eye a little with lead on upper or lower side, as the implement requires.

Ax Loosening on Helve.—Sometimes it is quite difficult to so hang an ax that it will not by use get loose upon the helve, and where this is the case, the trouble may be known to exist in one of three things: either the eye in the head is not of the right shape, the timber in the helve is green and spongy or the wedging on was not done as it should have been.

Often by filing away the edges of the eye so as to make them beveling a little,

the trouble is obviated, but most usually the difficulty arises in not knowing how to wedge up properly. For wedges, hard or flinty timber should not be used, for, made of such, they will work out in a short time. A piece of spalt oak is best, and should be well seasoned and made thin.

Split the helve as deeply as possible while it is in the head, then drive the wedge carefully, but firmly. If the helve is green at the time it is put in, it will very likely become loose after using a short time; in this case, remove the old wedge if it can be done handily, and supply with one thicker; but if it cannot be easily done, use a lighter one beside the old.

How to Hang an Ax.—When hanging an ax, a very good rule is to so set the head that a straight edge laid upon the outer end of the helve, at the point where the little finger comes when grasping for chopping, the line will strike the center of the cut, or the middle of the crowning edge; also, so that by sighting over the center of the outer end of the helve, the bit will be in exact line with the whole length of the helve.

Never burn the wood from the eye of an ax when you wish to put in a new helve, but bore a hole with a five-eighth bit through the center, and by use of a half inch chisel the wood may be removed. To avoid injuring the bit, bore from each side of the head, half way through.

Care of an Ax.—There is no tool about the premises more generally neglected than the ax. It is left on the ground or stuck in a log out of doors through rain and storm, and not unfrequently used as a hammer or maul. The damages arising from such misuse are in roughened and warped helve, and an early giving out from the rotting of the timber at the eye.

The air resistance is a matter of importance, also, and where the head of the ax is battered by use for driving iron wedges or breaking stone, the air resistance is greatly increased, and this will tell upon the chopper who swings the instrument all day. When through using the ax it should be placed where it will keep dry. The chopping ax should never be used for wood splitting. An old head, well hung, will do for this work.

The Double Bitted Ax.—Some have strongly advocated the use of a double bitted ax, claiming that you can use thirty or forty per cent. more weight with the same labor than you can with a single bit, or ax with a poll, and that the reason of this will be readily seen when you apply the principles of atmospheric pressure to the two kinds. In lifting the poll ax you have a dead lift of at least three square inches against the air, which, if philosophers be correct in estimating the weight of the atmosphere at fifteen pounds to the square inch, it is a lift of forty-five pounds.

In lifting the double bitted ax, it is argued you present to the atmosphere a sharp edge with two smooth and gently inclined planes, which not only meet with much less resistance, but which in the descending or cutting motion of the arm so fix and steady the opposite bit of the ax as to enable you to strike with

much greater accuracy, and consequently to save most all the labor expended in handling.

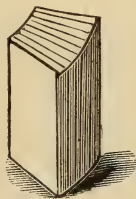
The position is not well taken, and no amount of argument will induce wood choppers to adopt it. If both bits are to be used, the helve would necessarily have to be straight. It is quite impracticable for any woodsman to chop as fast or as smoothly with a straight helved ax as with one having a helve of a proper curvature and an elliptical form between the hilt and the portion that enters the eye of the ax. A curved helve aids materially in putting the edge of an ax repeatedly in the same cut with almost unvarying precision.

SPLIT AND SHAVED SHINGLES.

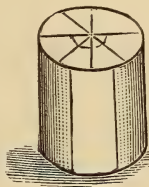
Timber for Shingles.—Quality as well as kind of timber is an important consideration in shingle making. Live timber should be used of whatever kind is employed. Pine is best, cedar, white ash, oak, hemlock, chestnut, etc., follow. See page 48.

Sawing Shingle Blocks.—The lengths of shingles vary from fourteen to twenty-four inches, but the length I would recommend is sixteen inches. The blocks should be sawed as true as possible that a regular line may be formed by the butts when the roof is made. If the blocks are not to be split at once, place them top ends downward upon the earth, so that they will not become dried and checked. It is always best to not cut the timber until you are ready to make the shingle, and then rive the blocks fresh from the saw.

Riving Shingle Blocks.—Place the block upon the butt end, then with chalk lay out the uppermost end, as represented in the illustration. Both heart



SHINGLE SEGMENT.



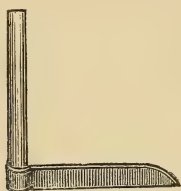
SHINGLE BLOCK, WITH
RIVING LINES.

and sap should split off. Rive up into blocks or segments for four shingles each, then split in the center, which will leave the blocks in sections of about three-quarters of an inch in thickness.

Thus far the work can be done by use of the ax and frow and mallet, but the balance of the splitting must be accomplished by hand pressure upon the

frow handle, after the mallet has been used to start the blade into the end. In the top of a piece of square timber, or a log with flattened surface on top, cut a slot by means of saw and chisel an inch and a half or two inches wide, and about three inches deep. The end of the shingle block is held in this when divided, and by it the split may be carried evenly through. When pressing upon the frow handle the separating fiber should be closely watched, and if the split is running to one side, invert the piece and the course of the split will be changed when pressure is applied to the frow handle again.

Shingle Frow and Mallet.—The frow can be made by any blacksmith, out of a piece of two horse wagon tire, and the mallet made at home out of a piece of tough, hard wood. The best material for a cheap mallet is a section of a small tree. Cut it about fourteen inches long, five inches through, and work down eight inches of it into a smooth, round handle.

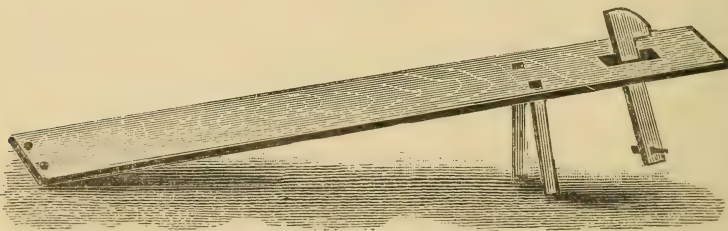


SHINGLE FROW.



CHEAP SHINGLE MALLET.

The Shaving Horse.—Where men make a business of shingle making, the double shaving horse is used, but for the farmer who wishes to make sufficient shingles to cover a building or two, that trouble and expense is not at all necessary. A good shaving horse may be made of a plank eight inches wide, The illustration shows the manner of constructing it so plainly that description



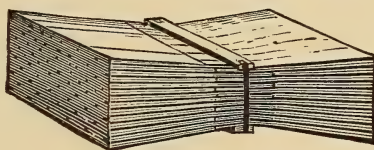
SIMPLE AND CHEAP SHAVING HORSE.

is not necessary. The lower end of the plank should be pinned or spiked down. The plank may be ten or twelve feet long, and the length of the legs govern the pitch.

Bunching Shingles.—Where the shingles are to be used upon the premises it is not necessary to bunch them, but they may be piled in the same order, double rows, butts out and thin ends lapped, until wanted. When they are to

be moved by wagon it is better to put them up in bunches of five hundred each. Four inches in width counts one shingle, so a shingle eight inches wide is two shingles; one six inches wide, a shingle and a half. To contain five hundred shingles, the bunch frame should be thirty-two inches wide, and there should be thirty-one double courses of shingles. In exact measurement it will lack four shingles of five hundred, but near enough for all practical purposes.

After the shingles have been placed in the frame and the top binder ready to be put on, a lever should be used to press them down firmly. This can be easily constructed by use of a long pole and a block for making the pressure with. Put the binding bar upon the side sticks, then place the block upon the



BUNCH, AS SHINGLES SHOULD BE PACKED.

center of the bar, and apply the lever; while one person presses down, another should saw off, split and wedge the side pins, and the work is done. Keep the butts and edges in line, so that when finished the bunch will appear as represented in the engraving.

PREPARING FIRE-WOOD.

Wood Sawing Machines.—Years ago, when the forests were abundant and timber land of the least value of any part of the farm to the husbandman, the ax was the best available implement for preparing fire-wood, but at the present time it should be used only as a minor aid. Time is too valuable and timber too scarce in most sections to make the old system anything but unprofitable.

The farmer cannot afford in these days of mechanical aids and substitutes to prepare his fuel by an entire use of muscle, and I commend the plan adopted by some of either owning a sawing machine independently, or by neighbors owning one in company, and sawing up all the fuel wanted for the year at a certain time in cool weather most convenient to the owner or owners thereof.

The farmer who thinks that a horse power and attachment, or an interest in the same, would be too expensive for him to indulge in, has not, I believe, fully considered the advantages to be derived from such a piece of machinery.

In the first place it may be appropriated to various uses about the premises; attached to thrashers, straw cutters, root cutters, lathes, clover hullers, etc., be-

sides its most important and valuable use in wood sawing. It will pay for itself every year in the saving of timber, time and labor.

Trees that would rot in the forest before any one would attempt to convert them into stove wood by the ax alone, can be easily utilized by a machine, and the whole labor of preparing fire-wood for the year, accomplished in a few days, instead of weeks, by dependence upon the primitive plan.

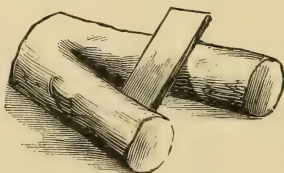
Season for Preparing Wood.—As to season for this work, I prefer winter, when the earth is frozen solid, at least this time for preparing logs for the machine. The logs should be hauled to the house and sawed there as convenience will permit.

There is a double advantage in this. First, it saves a great deal of handling, as the wood does not have to be loaded and unloaded, and more can be drawn in logs upon a crotch or dray than upon a wagon.

In the second place the farmer's work is so handy that he can begin early and work late if desired; have means at hand if breakage occur to repair again, and the splitting of blocks for odd job work, if this part cannot be attended to at the time of sawing.

It is better, if possible, to do the whole at once if it may be, for the blocks split much easier when first cut than they will after the atmosphere has dried the grains of the surface timber. If the blocks must lie for a time, place them on end so as to prevent as far as possible the drying out of the sap.

How to Split Wood.—It is not always understood that much advantage may be taken of hard labor, when splitting wood, by stabbing off the sides of the block instead of splitting through the center. When a log is sawed into short cuts, for example, to be split into fire-wood, two iron wedges and a beetle may be necessary to open a cut through the heart. But by taking off thin slabs, all of the splitting may be done with only an ax.



BLOCK HOLDER FOR WOOD SPLITTING.

Sugar maple is sometimes so difficult to split through the heart, that a laborer may drive in all his wedges and gluts without being able to open a log four feet long; whereas were the cut slabbed, the splitting could be performed with comparatively little labor. Then, after a log is split into slabs, the labor of splitting the slabs the other way will be comparatively light.

Holder for Splitting Wood.—After a block has been slabbed up, a holder will be found of advantage in finishing the work. A good holder may

be made of the crotch of a tree, one that will hold the stick of wood firmly, and at the same time protect the workman's feet against the liability of being cut.

At the wood pile, when it is not convenient to obtain a crotch, two straight bits of logs from eight to twelve inches through may be staked in position parallel, six or eight inches apart, or to make it portable, holes may be bored near the ends, and the two logs held a few inches apart by means of stout cross pieces or pins.

Green and Dry Wood for Fuel.—A great loss is often sustained in burning green wood for fuel, from an ignorance of the vast amount of latent heat consumed to drive off the water the wood contains. When perfectly green, it loses about one-third of its weight by thorough seasoning, which is equal to about twenty-five cubic feet in every compact cord, or one hundred and fifty-six gallons.

Now all this water must be evaporated before the wood is burned. The heat thus made latent and lost, being five times as great as to heat the water to boiling, is equal to enough for boiling seven hundred and eighty gallons in burning up every cord of green wood. The farmer, therefore, who burns twenty-five green cords in a winter, loses heat enough to boil more than fifteen thousand gallons of water, which would be saved if his wood had been previously well seasoned under shelter.

The loss in using green fuel, however, is sometimes overrated. It has been found by experiment that one pound of the best seasoned wood is sufficient to heat twenty-seven pounds of water from the freezing to the boiling point. It should be remembered that by ordinary modes of heating water, a very large proportion of the heat is wasted by going up the chimney, and into surrounding bodies, and the air. This will be equal to heating and evaporating four pounds of water by every pound of wood.

The twenty-five cubic feet of water, therefore, in every cord of green wood, weighing several hundred pounds, would require nearly four hundred pounds of wood for its evaporation, or about one-seventh or one-eighth of a cord. Hence we may infer that seven cords of dry wood are about equal to eight cords of green.

This imperfect estimate will apply only to the best hard wood, and will vary exceedingly with the different sorts of fuel; the more porous the wood becomes, the greater will be the necessity for thorough seasoning.

Superficial observation often leads to very erroneous conclusions. Seasoned wood will sometimes burn with great rapidity, and producing an intense heat for a short time, will favor an overestimate of its superiority.

Green wood kindles with difficulty, and burns slowly, and for a long time; hence, where the draught of the chimney cannot be controlled, it may be the most economical, because a less proportion of heat may be swept upward than by the more violent draught produced from dry materials. Where the draught

can be perfectly regulated, however, seasoned wood should be always used, both for convenience and comfort, and for economy.

Where wood is to be drawn to a distance, the preceding estimate shows the conveyance of more than half a ton of water is avoided in every cord by seasoning.

FORESTS AND THEIR PRESERVATION.

Destruction of Forests.—Wood is becoming an important item in some sections, and upon some farms, where heretofore there has been an abundance. and the question very naturally arises: What are we to do a few years hence for fuel and fence material, if our timber passes away as fast as it has recently?

One reason that forests are dying out so fast in the older portions of the country, is on account of the exposure of the roots to the sun's heat. Nature made them self-shading by density and undergrowth; but through the eagerness of the farmer to increase his tillable acres, he has narrowed them down into small belts and plats, and allowed his domestic animals to strip and kill out every rooted sprig within their reach.

Wagons are thundered over the roots without mercy; marks of the ax may be seen upon the most thrifty trees, and when felling one, two or three others are mangled and torn from lack of care. When a lever or skid is wanted, a young, thrifty sapling is cut; and through these causes the wooded lands are fast becoming open fields.

Another evil is the skinning process, which some practice, of taking every tree that will make staves, hewing timber, lumber or anything that can be sold in the market, though the price received be little more than a fair compensation for the labor bestowed.

Fine trees are cut down before they have half attained their maturity, and thus the goose that would lay the golden eggs is killed. This miserable practice is not simply skinning the land, but is as certainly skinning posterity.

Many farmers have been accustomed to use only the best wood for fire. Everything except one or two favorite kinds is left to decay upon the ground. From year to year the process of culling goes on, and what is wasted exceeds what is used, until the finest woodland becomes comparatively valueless.

There is still another waste of timber growing out of the opposite spirit. Some persons are so choice of their fine old trees that they cannot be prevailed on to cut, and convert to any useful purpose, such as have reached or actually passed their most perfect state.

To avoid waste every tree should be used before decay commences, in order

that the space and nutriment may be appropriated by such as will make a more vigorous growth. In fact, there may be waste both by tree murdering and by tree worshipping.

To Save the Forests.—To save the forests, they must be inclosed and protected ; underbrush must be allowed to spring up, to keep the soil from being parched with the sun ; no living thing cut unless absolutely needed ; and in this way the woods standing to-day may be made to improve every year in future.

Board fences are much more economical than rail, and old fences are greatly prolonged by frequent laying over, putting under new blocks, and a sound rail at the bottom.

An immense amount of timber might be saved by working up logs in a dry time, that at another time would not be considered fit for fuel. Old trees are scattered all through the woods, sap-rotten, but sound as a nut at the heart ; and if worked up, and put under shelter, will make good fire-wood.

The way to prevent the necessity of chopping into trees to find, in winter, whether they are alive or not, is to go through the forest when it is in full foliage and mark all the dead trees. Those which are only partly dead and dying may have different marks from those entirely lifeless.

Felling Forest Trees.—A matter which needs careful attention is that of felling trees. When the falling objects are allowed to crush away half of the tops of such trees as stand in their course, or to rake and scarify their trunks from limb to root, it must be expected that irreparable damage is done, and it may not be wondered at if these injured objects soon die, or at least begin to fall into a gradual decay. If a tree is not inclined in the most favorable direction for dropping without injury to others, either let it remain standing or force it by use of a spring pole ; don't mangle up your trees, at all events unless there is a large surplus to be got rid of.

Using Trucks in the Forest.—More work is done in the woods during winter and spring than in the summer, and the work is far more detrimental. Trucks and sleds are driven in all directions through the forests for hauling logs, fuel and gathering sap, and a constant and severe injury is perpetrated upon the roots of the standing, live trees.

It is a matter of decided importance that a general road be laid out, and this so located as to prevent the damage above alluded to. I have often noticed in the forests of supposed-to-be-careful farmers, scores of trees with the bark of the outstanding roots torn away, and the surface wood bruised by the heedless trundling of vehicles over them.

Trees for Fire-wood.—It is scarcely necessary in ordinary cases to ever cut a living tree ; and yet have sound, body wood for family use in winter, and when it is necessary, there should be a selection of such as have fallen into a decline. Such trees should be taken as are not fit for sawing or splitting into fence stakes.

Scantling for Skids.—When hauling logs or sled length wood, do not cut a nice thrifty tree for skids every time a load is taken, as is the too common habit. A couple of four by six scantling well seasoned, make good, light skids, and will last many seasons by housing during the summer.

When the last load is taken from a certain locality in the woods, put the skids upon the sled and take them out to the main road and leave them there until you return for another. Handspikes may be made to last for years also by care, they are lighter and better by being seasoned.

Clearing up a Forest.—Over a great portion of the woodland, old logs, oak tops, etc., are lying, which, to the farmers in general, are considered worthless; but in them are cords of good summer wood, if only worked up at the proper time.

The best way to manage these is to haul them out of the woods in the winter on to some open field, and lay them up from the ground a few inches, and when they are thoroughly dry the following summer, saw and split them up into firewood; and after being corded in the field a few weeks, pack in the wood house. Any one who has not tried this method of economizing in timber, will be astonished at what an immense quantity of good summer fuel may be obtained from material commonly counted as worthless.

Testing Soundness of Timber.—It is claimed by some that they can tell whether a tree is sound at the heart or not by striking it with an ax, also by the looks of the bark about the roots, but I have little faith in these tests, for I have seen them fail scores of times with experienced men.

The only sure test is to bore into the tree as low down as possible with a long handled inch and a half or two inch auger. The chips will show whether the tree is sound or not at the heart. When purchasing standing timber at a high price, this test is important.

How to Fell a Tree.—After it has been determined which way the tree is inclined, see that there is a good open space for the trunk and top to sweep down. A tree that lodges causes a great deal of trouble, and where the sweep is not clear, other trees are damaged by broken limbs and chafed sides, by its dashing down to earth.

If there is a better opening to the right or left of the direct incline cut the kerf so as to throw it in that direction. The kerf on the falling side should be cut more than half way through the trunk. To prevent long splinters from drawing out of the heart of a tree, let the middle be cut entirely off, leaving the outer edges to be cut away last.

By care in the use of the ax upon the corners, the direction of falling may be varied several feet. This faculty of "swinging a tree," by means of the ax, can only be attained by practice. In some very important instances the tree may be climbed and a strong rope attached, well up, and a strain brought to bear that will swing a tree out of its natural course.

TIMBER AND ITS MANAGEMENT.

Time for Felling Timber.—As on nearly every other subject, opinions differ as regards the best season of the year for chopping down trees, so as to leave the timber hard, tough and durable. Some advocate cutting in the month of June, while the tree is in full vigor, others give experience in favor of felling trees at midwinter, while the sap is inactive. Others still claim that trees should be cut in spring, just as the sap begins to flow vigorously. A few also advocate that fall is the best time, but my opinion after careful experimenting, is, that more depends upon kind and quality than season of cutting. I have put rails into fences of oak timber from different trees, all cut the same day, and while from one they lasted but a few years, from others they kept sound for a quarter of a century.

For elastic timber, such as hickory for bent work upon vehicles, my habit was to cut the tree late in summer. The next best time I consider to be midwinter, while the timber is frozen. The least sap the tree contains the better, as it seasons more readily and less fermentation takes place.

In late summer or fall the wood has ripened, the flow of sap having ceased. It is a noticeable fact that timber cut while the sap surface is soft, the wood is very liable to become powder-posted. Hickory should not be cut in spring.

Comparative Firmness of Timber.—Some idea as to the comparative value of timber for various uses, including fuel, may be gained from the following table—the wood of the shagbark hickory taken as a standard and rated one hundred :

Shagbark hickory, 100; pignut hickory, 95; white oak, 84; white ash, 77; dogwood, 75; scrub oak, 73; white hazel, 72; apple tree, 70; red oak, 67; white beech, 67; black birch, 63; yellow oak, 60; hard maple, 59; black walnut, 65; white elm, 58; red cedar, 56; wild cherry, 55; yellow pine, 54; chestnut, 52; yellow poplar, 44; butternut and white birch, 43; white pine, 30. Beech maple will rate higher for fire-wood than the figures given. It should be borne in mind that there is a great difference in timber of the same species; some pieces of hickory will not rate over fifty or sixty, and some pieces of oak and ash rate nearly, or quite a hundred. The estimate is only an approximate.

Lime for Preserving Timber.—The improved French method of preserving wood by the application of lime is said to be found to work well. The plan is to pile the planks in a tank and to put over all a layer of quicklime, which is gradually slaked with water. Timber for mines requires about a week to be thoroughly impregnated, and other wood more or less time, according to its thickness. The wood acquires remarkable consistence and hardness, it is stated, on being subjected to this simple process, and the assertion is made that it will never rot.

Getting Out Wagon Spokes.—While getting out timber for various purposes, the farmer may work up butts of oak or hickory to good advantage for wagon spokes, and get more money for the same than in any other way. Cut the blocks either two feet or twenty-eight inches long, as these lengths are always marketable.

Split them out, if hickory, an inch and a quarter on the heart, and inch and three-quarters broad. If of oak for heavy wagons, cut twenty-eight or thirty-one inches long, split out inch and a half on the heart, by two inches and a quarter deep.

Do not use sap wood on oak, but it may be measured on hickory. To split, first halve the block, then quarter, split off the heart, then work up to best advantage by marking out with a pencil. Always split with broadest part of the stick in direction from sap to heart. Cross pile, like laying the fingers of one hand over the other, and allow them to season in the shade, but exposed to a free circulation of air.

Getting Out Carriage Planks.—In sawing carriage timber, there is no necessity of squaring the logs; it not only causes waste in sawing, but also creates waste in cutting up. In sawing hickory logs, the slabs should be taken off two sides before any planks are cut, and then the plank should be alternated from each side. If this is not done, some of the planks will be thicker in the middle than at the ends.

Seasoning Carriage Timber.—Gradual seasoning is the best, but to do this, the timber must be protected from the sun and rain, and so situated as to allow a free circulation of air. It should never rest upon the ground; the best plan is to have the seasoning shed floored, and the planks or timber piled a few inches above the floor, so as to allow air to circulate under them.

Planks should never be allowed to remain undisturbed until they season; they should all be handled over and repiled after they have been piled up a few months, care being taken to remove the sticks from their first position. It is a good plan to turn planks over when repiling.

When piling at first, make a solid and level platform of four pieces of scantling, and use sticks between the planks that are of equal thickness, four to each, and directly over the bed pieces.

Four to six years are required to season timber for wagon work, but the stock may be disposed of by the farmer much before that lapse of time, as all good workmen keep a stock ahead.

The planks should be sawed inch and a quarter, inch and a half, inch and three quarters, and two inches. Oak, hickory and ash are marketable.

Maturity of Timber.—Each year the heart of a tree becomes harder, until it has attained its full growth. The age of timber may be known by the number of concentric rings of fiber; and whether it has reached maturity, or passed its prime, may be judged from the comparative hardness or softness of

the center compared with the exterior. In growing wood the heart is hard, and softens gradually to the bark; when wood is in perfection it is hard throughout; and when past its prime the heart is perceptibly softer than the surrounding parts.

Working Unseasoned Timber.—A farmer is more liable to work unseasoned timber than a practical mechanic, for the reason that his experience has not led him to so fully understand the importance of working seasoned wood. It is a fact that the durability of most work depends greatly upon the seasoning of the timber; loose joints, dry rot, and many other disadvantages arise from unseasoned wood. If you are obliged to use imperfectly seasoned timber, do not paint it until all the sap has evaporated. By confining any moisture with paint the wood must immediately begin to decay.

Seasoning Split and Sawed Timber.—Split timber will last longer than sawn timber, because the fibers are not divided, and the moisture cannot so readily enter the wood. Many carpenters who think only of getting paid for their work will use unseasoned timber, not only because it is cheaper to buy than that which is seasoned, but because it is so much easier to work. Thoroughly dry seasoned wood is considerably tougher and harder than wood containing moisture. Choose wood with the straightest grain and that freest from knots, and always take care not to have a knot on the edge of your work.

How to Pile Lumber.—Make a foundation of three pieces of scantling, the two outside ones as far apart from outside to outside as the lumber is long. Make the bed pieces level and in perfect range the whole lengths of them, and pile up the lumber with three sticks of equal thickness between the boards, keeping them directly over the bed pieces and at the end of the boards, out flush. If the stub-shots are not hewed off, place the sticks against them. Cover the top if out of doors. If the lumber is more than twelve feet long, it will be better to use four bed pieces and the same number of sticks.

Summer Lumbering.—The multitude of saw logs hauled to the mill yard in winter makes it impossible for the majority to so locate their logs but that another siege is required to get them on to the carriage-way; but when the truck is used in summer the yard has become so cleared that one job finishes the work. The earth is also solid, so that no damage is done the fields by the heavy loads taken across them.

Timber Wet and Dry.—Thoroughly seasoned timber constantly kept in water will last for a thousand years. Many of the piles of ancient bridges have been found to be as sound as the day they were driven. The same may be said of timber which is never allowed to be wet. There is framed timber in existence, and in good preservation, that left the carpenter's hands a thousand years ago.

Warping of Timber.—Often timber of the first quality is of no use, on

account of being sprung or warped. Hickory is more likely to warp than softer wood, and requires more care to preserve it. The difficulty arises from the natural tendency of the timber to spring as sawed from the log, and from the warping of the boards when exposed to the sun or air without being properly piled up, and being left without cover, so that the rain beats in on the planks, which causes them to warp with all the weights that may be put on. Much lumber is also spoiled by leaving it spread upon the ground at the saw mill for a few days in the hot sun.

Selecting Timber.—It never pays to use brash or decaying timber in an important place. Care should be used in selection. Longfellow wisely says :

"Choose the timbers with the greatest care ;
Of all that is unsound beware ;
For only what is sound and strong
To this vessel shall belong."

The age of timber when cut, the mode of seasoning, and even the nature of the earth it grew upon, bear considerably upon its strength. Much timber is felled at the wrong time of the year, on account of the value of the bark.

Planting Nuts for Black Walnut Timber.—The planting of nuts for raising black walnut timber will not pay, unless the work is done for the far off generations to come. On my home farm nuts planted more than thirty years ago have not produced trees large enough yet for good sized fence blocks. The tree is a slow grower, and unless it is located in a forest near a stream, grows bushy and low.

Durability of Black Walnut Timber.—Few kinds of wood are more lasting than this. I know of buildings, both dwellings and barns, that were weather-boarded with it forty years ago, some of which have been painted and others not, and in neither case is there any present signs of decay. A neighbor bought a farm, and upon it discovered a black walnut tree that had been blown down and partially covered with dirt, and an elm tree, a foot through, had grown over the log, sending its roots down on each side of it. Some time afterward he cut the elm away, and dug the walnut log out, and found it sound and good.

Sapping Timber.—The sap may be removed from non-resinous wood by boiling the timber a few hours in water, then by exposing to the influence of the atmosphere a few weeks will become seasoned sufficiently for use where hair joints are not demanded. Sap is extracted to a great extent also by felling the tree when in full vigor and allowing it to lie until the leaves drop off. The leaves will not fall of themselves till they have drawn up and exhausted the sap in the tree. The time required is from a month to six weeks, according as the weather is dry or moist. Trees so treated will never push again or show leaves as the stocks of winter-felled timber invariably do if allowed to lie, and thus prove that they have lost that vitality which the latter retains.

MAPLE SUGAR MAKING.

How to Make Sap Spiles.—The spiles may be made either of elder stalks, or from common soft wood lumber, three-fourths or an inch thick ; the former is preferable where a supply can be readily obtained. Bore a hole in a hard wood board with the bit to be used for tapping, and whittle the spile so that the end will just enter, giving a gradual taper back.

One great defect in making sap spiles is in giving them such shape that they may be driven half or three-fourths of an inch into the tree, thus stopping up all of the best flowing pores of the wood. Old spiles should be refitted. Cut off the ends and whittle them over.

Sheet iron spiles should be six or eight inches long, two inches wide, rolled a little concaving, and ground sharp at one end.

How to Tap Maple Trees.—People differ as to modes of tapping, some using the bit, others preferring the boxing process. Where the incision is not made deep, and frequent freshing over is performed, the boxing process is preferable, for the tree receives less injury and a greater flow of sap is obtained, but with not more than once freshing over in the season, the run will be fully as great from bit tapping, as the air does not so rapidly dry up the grains of wood in the cut.

The great injury to trees arises from sinking the bit too deep. The outer grains of the tree are those which conduct the greatest amount of water, and those grains alone will repair a wound ; so if the surface heals, there is a vacuum inside which promotes decay and eventually prostrates the tree. An incision made with an ax or gouge not more than three-eighths of an inch deep will entirely heal up.

When tapping select a healthy spot upon the tree, neither above, below, nor in the immediate vicinity of a scar.

No tree is so large as to make it advisable to use more than two spiles, and many trees that are put to use are too small for even one. The only reason that bit tapping is so generally adopted, is because of its convenience, and this method requires less "freshing over" than the other. The sap runs longer without extra work for man (the destruction to the trees is not, of course, taken into consideration), and this method gives satisfaction.

When the sheet iron spout is used, the tapping should be done with an inch and a quarter auger, and the cut should not be over one-fourth of an inch deep in the wood. The spile is driven into the bark of the tree firmly beneath the cut. The freshing over should be done with an auger an eighth or a quarter larger, and the cut made only one chip deeper.

If a farmer has not on hand the different sized augers, and does not wish to be at the expense of purchasing them, a two inch gouge may be made to

answer every purpose. It should be ground thin and very sharp, and the cut made with it about two inches long and not over one-half inch deep.

The gouge may be taken along when gathering sap, and any tree requiring it freshened in half a minute's time by taking off a thin shaving.

There are other advantages in this mode of tapping, aside from the preservation of the trees ; more sugar can be made, for a greater flow of sap can be obtained, and no loss sustained by leakage, as around the common wood spile.

A neighbor of mine, who has tapped his sugar trees for more than forty years, has followed this method. He has always made a wonderful amount of sugar per tree, and his maples are now in a vigorous condition.

Not long since I saw one of his trees cut down, and at the base where the tapping had been done the tree was sound, a complete knarl being formed, and so tough that it was impossible to split it stove-wood length. I have seen many maples tapped with a bit not more than ten or fifteen years, with the whole inner wood decayed.

Buckets for Sap.—I would advise no one to buy wooden pails when tin can be had at a reasonable price, for several reasons, among which are the lightness of tin, their compactness when stored away, their not drying up and falling to pieces, and the ease with which they are kept clean.

Whatever vessel is used, have it large. Farmers do not generally realize what loss they suffer every spring from the overflowing of buckets. We will suppose that in one-half of the camp vessels are used which will hold but six quarts each, and in the remainder buckets which will hold sixteen quarts each. Now, when the gathering has been neglected until the larger buckets are full, which will ordinarily occur several times in a season, and supposing the trees to be equally good, there has been a waste of ten quarts at each of the trees having the smaller vessels ; and supposing that number to be two hundred, there has been a loss of two thousand quarts, or five hundred gallons of sap, which, at a safe calculation, would have made one hundred and twenty-five pounds of sugar.

Methods of Gathering Sap.—The sled is commonly used for sap gathering, but I have found a crotch, or, as farmers call it, "dray," much more convenient. See page 381. Put the gathering barrel or barrels on crosswise, having a barrier each side, and fasten with a rope or chain. With such an arrangement short turns can be made, logs passed over, and almost any point reached where a horse can go ; and by making an elevation beside the store trough, and the use of a small conductor, the barrel may be conveniently emptied.

A watchfulness should be kept over the camp, and the buckets never allowed to run over. When there is a prospect that sap will run all night, just at dusk go around the bush and empty the fastest running trees into the buckets of those that run slower, and at daylight start to gathering ; taking those that are

full, or nearly so, first. Gather the whole bush at least once each day, even if there are but a few buckets full, as sap will soon sour if left in the buckets, and they will then have to be scalded before the next run.

Soft Maple Sap.—The sap of the soft maple is not as rich as that of the hard maple, taking from one-fourth to one-third more to make the same amount of sugar. But the former flows more freely than the latter, so that the yield of sugar is nearly equal to that from an equal number of trees. This involves more labor in gathering and boiling; but, again, the soft maple commences its run earlier, so that maple sugar making from it is out of the way of all preparation for spring work on the farm, and gives the advantage of an early market, which is an important item, as all sugar makers are aware.

Care of Sap Pails.—When sap pails are brought from the woods they should be dried slowly, and the hoops started up now and then until the buckets are perfectly dry, then set away in the storage room, bottoms upward. If not entirely sweet when coming from the sugar orchard, they should be cleansed before drying. A coat of paint outside and an oiling inside will pay richly.

Funnel for the Sap Barrel.—Bore an inch and a quarter hole lengthwise through a block of soft wood five inches long, then work this block down to fit an inch and three-quarter hole bored in the bottom of a wooden pail. The funnel spout will then go into a two inch bung hole of the gathering barrel. Screw some saddle pieces on the bucket bottom, so as to make it stand level on the barrel. When gathering sap keep a little clean straw in the funnel, as it will effectually prevent leaves and sticks going into the barrel.

Storage for Sap.—The estimate is that storage for six barrels of sap is required for each hundred trees. The trough is perhaps the cheapest device, and certainly sap may be put into it with less trouble from the gathering barrels than into a large cask. Casks, however, answer a very good purpose when the sugar house or boiling arch is located on a side hill, so that the sap may be run from an elevated point to the storage cask.

Some farmers have the very commendable method of drawing, during winter, a load of ice to the sugar house, and covering it with saw dust, to preserve it till wanted. During the warm, spring days ice may be kept in the sap, and there is no danger of its souring, which is one cause of the sugar not graining as well toward the close of the season.

Boiling Pans vs. Kettles.—Pans are rapidly taking the places of kettles for boiling sap; they are more efficient in the work, and much less fuel is required, as the pans have a greater evaporating surface.

Where kettles are used, arches should be constructed to save wood and keep the sap clear. Where an open fire is made there is a continual cloud of scorched leaves, soot, etc., dropping into the kettle, and giving to the contents a hue not inviting, and one very difficult to remove by cleansing.

The pan should be eight or nine inches deep, and large enough to meet the

requirements of the farmer. The arch should be made with a furnace similar to those used under steam engine boilers, and be the same width inside as the boilers used, lacking four inches for support. If three boilers are used, set the one in the middle two inches higher than the one at the mouth of the arch, and the third two inches higher than the second.

Set the pans or boilers close together, and furnish the third with a short tube, two inches from the top, that will convey the sap into the second, and arrange the second in the same manner to convey the sap into the first. By this arrangement all of the labor of dipping from one pan or boiler to another is avoided.

A stream, just enough to keep the sap at the right height, should be kept running from store trough into the highest boiler, and regulated by a faucet.

Sugaring Off.—After the syrup has been strained through a flannel cloth, it should be allowed to stand until it has settled; then pour off all that appears pure, and put over a slow fire in such a manner that the blaze cannot reach up the sides of the kettle, for in this way more sugar is spoiled than any other. Cleanse by using half a pint of new mill and one hen's egg to each gallon of syrup. If the sap from which the syrup was obtained had soured, put a tablespoonful of saleratus into each pint of the cleansing material used.

If it is noticed while sugaring off that the syrup is scorched, immediately put in some cold sap, or if not at hand some water, and stir the whole rapidly until it begins to boil. This will remove much of the bitter flavor.

To determine when the sugar is done many modes are practiced, but, perhaps, the safest test is by use of water or snow. When the sugar is to be caked for draining, the wax should harden, but be somewhat elastic; when for dry cake, the wax should be hard, but neither elastic or brittle, and when for stirring, so that it will break and fly like glass.

To stir sugar let it stand after it is removed from the fire undisturbed until it begins to expand, or rise up, then stir it until cold.

How to Use the Settlings.—Many persons throw away the skimmings; but these, with the settlings, should be saved, and when you have ten or twelve quarts, add to them two or three pails of sap, place them in your sugaring off kettle, and just as they come to a boil remove them from the fire and skim thoroughly, strain, add eggs and milk, then skim again as long as any dark colored scum rises. These second skimmings pour into a thin cotton cloth strainer and hang up to drain. Never press the contents of the strainer; let them drip; all the sweetness will eventually drain out and leave a hard ball in the strainer.

Making Maple Molasses.—By no means make settlings into molasses; they are much better made into sugar or vinegar. Molasses should always be made from the best material early in the sugar season.

When the syrup is of the proper consistency, pour it into the cans or jugs while hot, and seal at once. It will keep a long time, and retain the rich maple flavor. To test the thickness of molasses while cooking, cool a little.

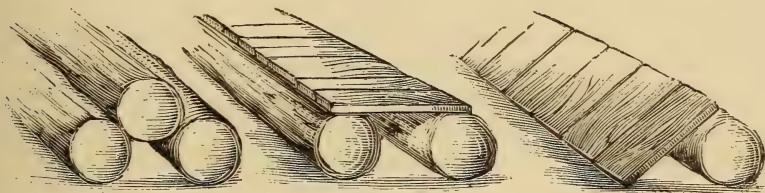
CHEAP UNDERDRAINS AND DITCHES.

Necessity for Land Drains.—There are but very few farms so well located but what more or less ditching or draining would better some parts of the same, and there are innumerable farms that would be improved in almost every part by underdraining. Husbandmen not infrequently feel too poor to purchase tiles, and, therefore, allow the necessary work to go undone.

While the system of tile drainage is a most excellent one, it is not absolutely necessary to obtain tiles to do a good, durable job of underdraining; nor is it necessary to make any money outlay, or to go off the farm for material. Some of the cheap methods that have proven to be effectual and enduring are given in this work.

How to Make Brush Drain.—Brush drains are condemned by some, but probably by those who have never made one, nor do not know how to make one properly. A good deal depends upon the soil. In a stiff clay it works better than in a loamy soil.

The bottom of the ditch should be about a foot in width and the brush laid in all one way, with the tops down stream. It is best to have it free and of good size. Make a depth of brush ten or twelve inches, well packed in, and lay on the top a good slab. Put upon the slab some straw, or leaves from the woods, to prevent the dirt from working down into the brush. Such a drain will last for years. When filling up, round the top well, for the brush will settle more or less.



THREE LOG DRAIN.

TWO LOG AND PLANK DRAIN.

ONE LOG AND PLANK DRAIN.

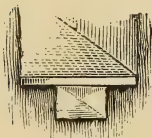
Draining with Poles.—There is a method adopted by some which combines the use of both poles and brush. At one side of the drain bottom is laid a pole six inches in diameter, then short sticks, three inches in diameter, are laid crosswise, one end resting upon the pole, the other on the bottom of the drain. Now long, light poles are laid lengthwise, and brush put on top of all.

A cheaper and, I believe, just as good a method, is to use two bed pieces, and a third pole on top. The ditch should be cut just wide enough so that when the two six inch poles touch the sides a space of three inches will be

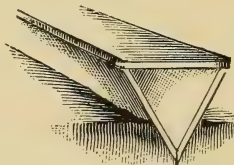
left between them. When the third pole is laid on top, a water channel is left below.

A correspondent says, in 1852 he filled a large drain with beech and sugar maple poles four or five inches in diameter, with the bark on, one placed on each side of the bottom of the drain, with flat stones on top of them.

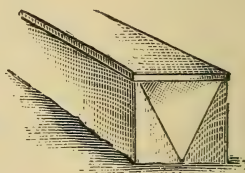
In some instances one pole only was laid in the ditch, on one side, and flat stones, which had been hauled one and a half miles, were laid with one end on the pole and the other end on the ground in the bottom of the ditch. He examined some of these poles after they had lain there eighteen years, and although they were somewhat "dozy," as we usually say when timber is in the first stage of decomposition, still he is confident that those drains will be as serviceable for twenty years to come.



DITCH AND PLANK DRAIN.



TRIANGLE BOARD DRAIN.



SCANTLING TRIANGLE DRAIN.

Plank and Board Drains.—Board and plank drains are constructed after various plans. They are, of course, more expensive than poles, and do not serve a better purpose; but sometimes poles are not readily attainable. One system of board draining is to dig a ditch a foot wide at the bottom, then with a narrow spade cut a channel six inches wide and the same number of inches deep along the middle of the bottom, and cover this with an oak plank or thick slab, belly up, resting on the shoulders of the first bottom, and fill up the ditch as for other blind drains. In soft land I have seen the water track made by nailing together two narrow boards like an inverted V, and laying this upon a bottom board.

Another plan is to nail the boards together in a V shape; then put them in a ditch sharp side down as the letter stands, and put any coarse, rough stones under the sides of the trough so as to help sustain them. Cover with boards or thin stones. The water from both bottom and top is allowed to escape. By making a small channel or indentation for the trough to be bedded in, it will be very firm and lasting.

Still another way is to split scantling beveling, by use of a saw, and by turning the left hand piece end for end, and the other side up, you get a V shaped drain. The covering may be a piece of slab lengthwise, or bits of slab, or any waste bits of board, cut to cover it crosswise,

Draining with Tiles.—The size of main tile drain depends on the amount of water that is required to pass through it; but it should not be larger than necessary. Two inch tiles are generally used for the branches; but in every case the size and number of drains should be sufficient to carry off surface water thoroughly and rapidly.

Be sure, in laying tiles, that they are placed without any depressions, where the water will be sure to deposit its sediment, and finally fill up the drain. Roots of trees or vines, planted near such drains, are also very apt to enter and choke them up. They should always be laid deeper than the frost can reach during the most severe seasons. Many American farmers err in making their drains too shallow.

In laying all tiles, care must be taken also that the bearing be firm and uniform throughout, so that the joints shall not be misplaced and let in dirt to choke the water course. If the soil is soft, it may be well to underlay the tiles with narrow oak boards, which will keep them in place some years, and until the earth is evenly compacted about them.

The Plow for Ditching.—First plow two furrows along the line marked out for the drain, and after throwing out the dirt plow again by lengthening the chain. After cleaning out the second time, hitch the plow to the center of a strong axletree, with low wagon wheels upon it, and attach a team each side. The plow will now go down to the desired depth by giving length of chain.

How to Lay Out a Drain.—The drains should always be put in with reference to a general system for the whole farm. It is best to survey the ground for this purpose, and if you cannot do it, get some one who can.

Flat, or nearly level land, requires more care in making drains than that which is rolling. No farmer can, in this, copy after another, as every farm differs in many features from all others. Some require more and deeper drains than others, and with some the springs issue from the tops of the hills, and in others at the bottom. This depends on the peculiar geological features of the country.

It is always advisable to follow the general slope of the surface. If the field to be drained lies at the base of a hill from which water “seeps” out, first lay in a large head drain, parallel with the base of the hill, to take up the water and prevent it from working down on the field.

All ditches or underdrains should be laid out as nearly in direct lines as the lay of the land will allow, which will help the water to flow off more freely and prevent the accumulation of trash, which is apt to clog up the turns or eddies in the ditch. But this directness must not be at the expense of the grade, which is a matter of first necessity in a water course.

To Make an Open Ditch.—In very wet places, where a large volume of water is to be carried off from a deep and porous vegetable deposit, an open

ditch is the most readily available and much the cheaper method of drainage, since a single broad ditch through the lowest portion of the tract, with a few wing sluices leading into it from the neighboring pools, will soon take off a majority of the dead water and leave the ground in a condition to compact and ripen, preparatory to being put under cultivation or for bearing tame grass.

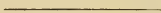
The main requisites for a good ditch are a grade which will not dam the water in any place, and sides cut to such an angle from the perpendicular that they will not slough off or cave in, to fill up the ditch and obstruct the flow of water. In clay ground the sides will hold if made nearly perpendicular, but in softer soils, and particularly in sand or muck, the slant of the sides should be considerable—often not less than one-third pitch.

Protecting Drain Openings.—The mouth of the main drain should be shielded by wires. If the head or source of the ditch can be left covered, it is better. It may be done by placing something firm at the end of the last tile.

During summer, while it is dry, mice and larger animals are very likely to make abiding places of the drain if allowed to, and sometimes may seek refuge there when frightened, and, being unable to turn to get out, die of starvation and stop up the drain.



ROCKS AND BOWLDERS.



Bursting Bowlders with Water.—There are various processes of blasting large rocks to remove them, but as the employment of powder or other explosives is always attended with some danger, it is resorted to as little as possible. One method that has been used to advantage in some cases is to drill a vertical hole in the mass, fill it partially with water and closely fit into the same above the water a steel mandrel. A heavy blow from a sledge or from the falling hammer of a pile driver upon the mandrel causes the water to exert a sudden lateral pressure which ruptures the rock.

The great objection to this apparently simple plan is the nicety required in properly adjusting the mandrel in the bore, which of necessity requires more perfect tools and appliances than are commonly available upon the farm. If it is desired to use gunpowder, for manner of doing it see "Blasting Rail Cuts," page 403.

Bursting Bowlders with Lead.—Still another method, requiring less skill, is that in which the hole or bore formed at a suitable point in the rock has fitted into its lower portion an ingot of lead of corresponding shape and size in its transverse section. A mandrel of similar form and of hardened steel is then placed in the bore with its upper end projecting out. The mandrel is then sub-

jected to repeated blows from a hammer or sledge, each one of which increases the lateral expansion, until at last the boulder is burst open.

Bursting Boulders with Heat.—A cheap and very effectual way to remove a rock is to heat it until expansion sends check lines all through, and divides it into numerous parts. If the boulder is bedded in the ground, the dirt should be removed about the sides, so that a good portion of the stone is exposed, then fuel applied plentifully.

Old rubbish about the premises, such as should be destroyed, will answer to make the fire, and thus two objects attained. Some rocks, when heated, will flake at first at the top. In such a case, the pieces should be forced off by means of a long poker.

Moving Boulders.—Where large rocks are to be moved without severing, the stone boat or crotch dray will be found most suitable. Lifting machines are too expensive where but little of the work is to be done, and the long lever is nearly as good. With a good purchase a man can lift a heavy boulder from its bed and turn it upon the stone boat. Boulders make excellent corner rests for barns.

Burying Boulders.—Where there are but few boulders upon the premises they may be buried by digging pits close beside the rocks. Be sure and get the pit large enough before rolling the rock in. A second trial with one rock cannot easily be made. Bury at least a foot below the surface.

Use for Boulders.—Where boulders are not sufficiently numerous to be of use for fence or wall making, they may be turned to good service for ornamental purposes. See "Door Yard Rock Work," page 96. Rocks may also be used for the construction of duck houses. They may as well be of this material as of wood or brick. Of course, the house should be located at an appropriate spot; on the margin of a stream or pond, and near a lawn.

The rocks may be built up to suit the taste of the one constructing it. The inside should be made of brick or stone, cemented, so as to be warm in winter. The better way is to construct the brick part first, and then cover the exterior with large, medium sized and small boulders, intermixed so as to give a pleasing effect. "In the rear there should be an opening to allow of access to the cave, and this may be closed by a door of cedar strips. In arranging the rocks with a view to the growing of plants, crevices of different sizes must be left, and these are to be filled with vegetable mold from the woods, or peaty earth, mixed with sufficient sand to keep it always loose, as success in growing plants in such crevices depends on having the earth they contain in connection with the soil below." Small rocks, hard-heads and large boulders broken into fragments make good foundation material for the margins of springs, for paving around watering troughs, or in marshy spots where a road is required. The same material also may be worked into stone walls, and especially are they adapted for stoning wells.

MANAGING FARM STOCK.

Refractory Animals.—Any farmer is really unfortunate who possesses a balky horse, kicking cow, or breachy animal of any kind, and the best way to get rid of the evil is to dispose of the beast, even if it is done at something of a sacrifice. Refractory cattle should be prepared for the shambles; refractory horses put upon tread powers if balky, and to city use if unruly. There is neither peace nor profit in keeping such, and the real aim of life should be to make the situation as comfortable as possible.

Kicking cows are sometimes kept on the plea that they are good milkers, but it is not a fit one, for a fatted cow will bring sufficient money in the market to purchase a good, kind milker any time, and the perplexity saved is worth the price again, annually. I do not speak of this as a looker on, but from my own experience as a farmer and dairyman, and I know that the husbandman never feels happier concerning his farm regulations than when he determinedly resolves that he will not have a balky, kicking or unruly animal upon his premises.

Light Farm Teams.—Mechanics, in selecting their power, act wiser than many farmers, for when they buy an engine, care is taken to get one heavy enough to do their business thoroughly; but too often the farmer buys a cheap, light team that is not capable of performing one-half of the necessary labor, and the result is, that he gets into the habit—which is indeed a matter of necessity—of gauging the depth of his furrow by the strength of his team, and as a result he impoverishes his farm and realizes but half crops, and finally becomes discouraged and tries some other business.

Watering Horses in Harness.—Many men abuse horses through thoughtlessness, or through inconsideration, and think they are really kind to their dumb servants, and it is to such that I have a few suggestions to make.

In hot weather horses suffer from the want of water, and when working continuously, as upon the plow, harrow or mowing machine, should have water more than three times a day, as is the common custom. When driving the team upon the road it is thought advisable by horsemen to water every hour or so, but when in the field, and engaged in heavy work that causes a greater heat of the blood and more profuse flow of perspiration, once in five or six hours is deemed all that is necessary.

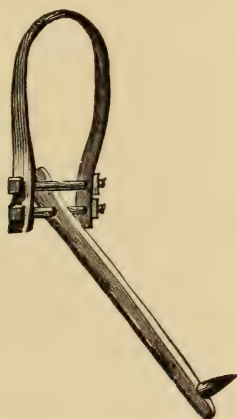
Now while the farmer is making the thirsty animal, that cannot tell its wants, labor on in distress, he is not found neglecting his own physical demands, as the frequent visits to the water jug will attest. Time is absolutely gained, for more and better work can be performed by taking the team from the field, even half a mile to water, at least once in the middle of the forenoon and once in

the afternoon. Where it is necessary to go a long distance from well or stream, water should be taken to the field in a barrel.

Always loosen the check rein before giving water to a horse. If watering with a pail, hold it no higher than is necessary to relieve the neck from pressure upon the collar. It is not natural for a horse to drink with his head up, any more than it is for a man to get down to drink.

How to Drench a Horse.—Take a piece of lath about three feet long, bore a hole one inch from the end, take a strong cord, put it through the hole and tie the ends together. Now you can put it on the nose as a twist, or into the mouth, and push his head right up. I prefer putting the cord into his mouth; then you can drench him without trouble. Never drench through the nose; common sense teaches better than this, for a horse never drinks through the nostrils.

Poke for Breachy Animals.—When about to make a poke for a certain horse, take a flexible stick and measure over the animal's neck for length of bow, and then cut the stick accordingly. A green hickory, three or four inches in diameter, split in the middle, worked into proper shape, makes a good



POKE FOR BREACHY ANIMALS.

bow, as it will bend easily and prove durable. The illustration gives an idea of construction. The object of the double pins is to prevent the swingle beating the horse's knees. The swingle should be about thirty inches long. When attempting to jump the swingle pin catches under a rail and holds the animal down.

Blanketing a Horse.—Where a blanket is kept on in the stable, it should be thin and cut so as to fit nicely around the neck and shoulders and be well strapped on. The object of stable blanket is not for warmth, but to keep the hair of the animal in good condition. When the horse is put into the

stable warm, put on the thick outdoor or dress-up blanket until the pulse has gone down, then remove this and put on the stable blanket.

Blankets are more damage than benefit for out of door use, unless used faithfully and put on *every time* a stop is made after a fast drive or heavy pull in cold weather. A horse accustomed to protection will most certainly take cold if allowed to get chilly after heating the blood. The blanket should be taken to the woods in winter, where heavy work is being done, and used there when the team is resting, if accustomed to it, as much as when used upon the road.

Horses sometimes rub off their blankets at night in the stable from the uncomfortable feeling of a tight girt. To remedy this either have the girt padded or buckle it loose, and fasten the blanket partly under the breast.

Testing a Horse's Eyes.—In buying a horse particular attention should be given to the eye. It should be clear, stand out round and full. The eye-brows and lids should be free from bunches, and there should be no swelling under the lower lids. I would turn from a horse that has a dull, sunken, flat eye. In nine cases out of ten there is trouble connected with it. Either the disposition of the horse will be bad, or he will be lazy, or his eyes will fail.

A good way to test the present condition of sight is to lead a horse out of a dark stable into a strong light. If he knits his brow, throws his head up as if to get more light, acts if he wanted his glasses to see clearly, you may be sure he has bad eyes.

To Cast a Horse.—A very good way to cast an animal, says one of experience, is to pass a rope first around the neck, a noose being formed in the center of a strong rope, the ends of which are carried between the fore legs, each respectively drawn through the ring upon the hobble put upon each hind fetlock and afterwards through the rope collar upon each side. The head being secured, force is applied to one rope in a line with the body, the pullers being behind, and the other at right angles or from the side. When the animal falls, the ropes must be secured by drawing them into knots at the collar or around the fetlock of the hind feet.

Halter Breaking Young Colts.—Any time after a colt is two weeks old, it should be halter broke, so that when the dam is in use, either upon the road or farm, it may be kept at her side or secured in the stable. The halter may be put on with little trouble in the stable. Have the mother harnessed, and hitch the halter strap to the hame ring, not giving more than two feet play room; then lead the dam out, and the colt will be obliged to follow, and will soon give up.

Any young animal will submit to coercion if the force appears to be the will of the parent. For this reason I do not approve of halter breaking young colts by hauling them about, or being hauled about by them.

Every person who drives his team upon the highway, the colt to follow at will, experiences more trouble by having it follow off other horses, or getting

lost from the dam, than to ten times pay the expense of a halter and halter breaking, and besides it is not safe or profitable, when using the mare in hot weather, to allow the colt to suck at any time it may choose.

Colts are easily injured by taking heated milk, and do not recover from the effects for a year or more—in fact, never get entirely over it, for they become reduced in flesh, get lousy, shed their hair, and barely pass through the first year of their existence, which is the most critical period of their growth and development. An inferior yearling is not usually chosen to make a good horse.

How to Bit a Colt.—A colt breaker says that all you can possibly accomplish with the old fashioned biting bridle—that is, to teach the horse to hold down his head, hold up his head, and to the right and to the left, at the touch of the rein—can be accomplished with the bridle described below in forty minutes. “If nature has not designated the horse to have a stylish head and carriage, no art of man can alter it; and the old fashioned way of straining up the neck in an unnatural position, and leaving it there for hours, nine times out of ten results in a heavy-headed lugger on the bits.

“Take a cord and fix a loop upon the end, just like one used to go over the jaw, only big enough to go over the neck and fit down rather tight where the collar is worn; now bring your cord forward, put through the mouth from the off side, and bring back on the near side, and put through the loop around the neck; now pull upon this cord, and the head will be drawn back to the breast. You are now prepared to bit; simply pull upon the cord a little, and as he curbs his head well, relieve him; that teaches him that it is there you want it.

“When you want to raise his head, lift quickly on the cord, and you lift his head finely. You should not bit over five minutes at a time, and then put it away, and in forty-five minutes’ time, dividing each biting into five minutes each, you can bit your colt well.”

Halter Breaking Young Horses.—A farmer says to halter break a colt or young horse get the animal into a stall wide enough to allow him to turn freely, but so small that he cannot back more than two feet. Have ready a plain headstall, and handle the colt gently, so as not to alarm him. Leave the headstall on for a day, and then tie in the hitching strap and pull upon it, first one way and then the other. He will soon learn to move his head as you pull. Now tie it to the neck, just long enough to allow him to back as far as the stall will permit without straining the halter. He will perhaps try to turn round in the stall; but as the pull comes sideways, he will soon give it up.

“Next, confine him in his stall so that he cannot turn round, but so that he can back five or six feet. Then pass the tie rope through a hole in the rack; put upon the end a weight of half a pound. He will back the full length of the stall; but the weight is more than he likes to hold, and he walks forward for relief. Now shorten the halter one foot; he will back and pull gently upon it for a moment, but only a moment.

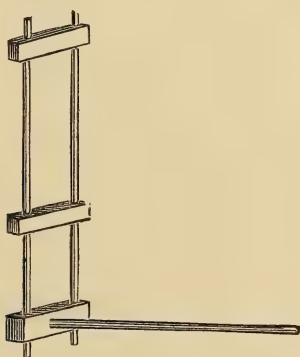
"Now take him into a wide stall, and keeping hold of the halter, accustom him to move with and after you, until you have taught him what you wish, when he may be taken out and lead anywhere. Of course, he will be awkward and not turn readily for a little while; but if gentleness and firmness are used, there will be no necessity for force. I never had occasion to use it, in handling colts in this manner, during six years."

To Break a Colt to Ride.—Never attempt to break a young horse to saddle and harness at the same time. After the colt has been well bitted, make yourself familiar by laying the arm over the back and pressing downward; then other objects may be placed upon its back, secured, and the colt led around. When familiar with this he may be mounted, but care should be taken not to permit him to travel faster than a walk until his action has become easy and free from nervousness. Even then, for many weeks, he should not be allowed to do more than trot gently on level ground, and never be galloped unless on springy turf. Too deep a soil causes a horse to labor, and if frequently galloped on such, his action becomes higher and less rapid than it otherwise would have been. A more heroic way is given by one who has broken wild colts. He claims he can ride the wildest colt in America in two hours by the following process: "Put the colt in a pen, blindfold him; put the saddle on and fasten it tight; pass a strong cord between the stirrups and tie each end to its respective stirrup, so that if the colt jumps sideways the stirrups will not fly over his back. Use a common snaffle bit, with double reins; draw the lower reins tight and fasten to the horn or pommel of the saddle, leaving the upper ones loose. Now commence driving the colt around the corral; keep him going until he shows signs of exhaustion, the blinder being removed. Have a man ready with a saddle horse to take the lead; blindfold your colt again, gather up the loose reins firmly in your hands and mount; seat yourself firmly, pretty well back in the saddle, and draw the blind off. Ten to one the colt follows the other horse rapidly, and there is no possibility of the colt's throwing you, unless he falls backward. If he is stubborn, and lies down and refuses to go, a new plan must be tried. Take a short strap with a buckle and fasten up the fore foot, put a one-half inch rope around the other fore foot and let him get up; go toward him, and if he makes a jump throw him; after being thrown a few times he will learn how to behave himself, and suffer the rider to mount without difficulty. A horse with his head curbed cannot kick up; no horse can unless he can get his head down. The treatment with the rope is equally good in breaking horses to harness, only the off foot is not strapped up, and the rope is passed through the large ring in the hame."

Breaking a Colt to Drive.—The animal should be made perfectly familiar with the harness before it is hitched to a vehicle. After no more attention is paid to the harness, tie a strap or rope to each tug, and as the colt is led or driven by the lines, let a second party with the cords in his hands offer

a slight resistance as the animal moves forward; by such an initiation the alarm frequently occasioned by the pressure of the collar against the shoulders is avoided, as the man who holds the cords can instantly relax them if necessary. After two or three lessons of this kind, neither trouble nor danger need be apprehended in putting the animal to any employment calculated for the advancement of his education in the art of drawing. A two wheeled vehicle should be used first, if the colt is hitched up singly. This should not be a heavy, noisy affair, but light and still in its action.

Pokes for Horned Animals.—An improvement upon the common poke with the bow block and swingle is made by use of two straight side pieces and three cross sticks, as represented in the illustration. The poke



POKE FOR HORNED ANIMALS.

should be deep enough to come down nearly to the animal's knees, thus preventing an unruly cow or steed throwing the swingle over a low fence before making the attempt to jump. The poke will not interfere with the animal's grazing. The poke is put on and taken off by the top piece being movable, and held in place by pins.

Poke for Sucking Cows.—To prevent self-sucking, Prof. Law says: Make six bars of the requisite length, to extend from the head to the shoulder. Bore two holes in each, close to the respective ends. Carry a rope through the holes at the anterior ends, and another through them at the posterior ends, by which to tie it around the neck; have the bars kept at appropriate distances from each other by knots on the rope. If properly adjusted, this will put a stop to the sucking.

Another Device.—Take a thin piece of basswood board two and three-quarter inches wide, and four and a half long, hollow at one side near the edge, so as to form two lobes. The distance between the knobs of the two lobes is about one-fourth of an inch, just enough to permit their being pressed over the thick edge of the cartilage of the nose, and close enough to keep it in place. It

hangs down over the cow's nose, and prevents her getting the teat into her mouth, but does not hinder feeding.

Still Another Device.—Take a stiff piece of leather long enough to go around a cow's nose at the smallest part between nostrils and eyes; adjust this by strap running over the cow's head back of horns. After it is adjusted, drive through the part that comes on top of the nose several wrought nails filed to points; then line with a second band of leather to support the nail heads, and rivet the two together.

It is best when measuring for the nose band to put the two pieces of leather together, so as not to get the band too tight. An old harness tug, soaked soft, ripped open on one side, and the nails inserted from the center, will answer a good purpose. While the leather is wet bring the edges together again and fasten either by stitches or rivets.

Timber for an Ox Yoke.—The chief points in selecting timber for a yoke are lightness, toughness and strength. Red elm, soft maple, wild cherry and basswood are most commonly used, maple, perhaps, more than any other, as it is less liable to spring when hard draught is brought upon it.

Size of the Ox Yoke.—As much depends upon the general dimensions of the yoke as upon its shape. If a yoke is too short, the cattle will soon get into the habit of hauling, which is exceedingly disagreeable. If not of the right depth, the yoke will not set square upon the neck, and the result be chafing of the skin. To be right, the bows should stand about perpendicular when a load is being drawn.

For an ordinary yoke of oxen, the stick should be about five feet long, ten inches deep, and six inches and a half thick; for heavy cattle, larger every way.



FIG. 1.—TOP SHAPE FOR OX YOKE.

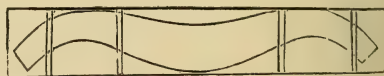


FIG. 2.—SIDE SHAPE FOR OX YOKE.

How to Lay Out an Ox Yoke.—First square the stick on one side and one edge, then find the center, and one foot from this point, each way, bore the inside bow holes with a two inch auger. To bore the holes set the stick on edge, make a guide line down the side, and be careful to make the hole true. Next measure out ten inches from the two holes, and bore again for outside bow holes. Now the stick is ready to work into shape.

Lay out the top as in figure 1, having the center and ends five inches wide, and work off with gradual curve. To lay out the side, make a gradual curve from end of stick to same distance beyond inside bow holes; *i. e.*, same as from outside hole to end, and work out so that the central spot between the bows is three and a half inches thick. After both ends are concaved, carry the

curve to the center of the stick, as in illustration No. 2. The thickness up and down at center of the yoke should be six and a half inches. The concaving at the top should correspond in its oval shape to the curve below.

Carry a gentle circle on upper side from between the bows to end, which may be left three inches in thickness and nicely rounded off. A very good finish for the yoke is a slight rounding of the sides, leaving the top and bottom square or flat. Dress out the concave between the bows a trifle rounding, and sandpaper until perfectly smooth. The yoke may be painted red, or any other color to suit the fancy, or simply oiled. The bows may be bent over a form similar to one described under head of "How to Bend Timber."

How to Break Cattle to Lead.—A cattle breeder says: "Take two animals of about equal size and strength, and tie them together with a strong rope by placing one end around the horns of one animal, and the other end around the horns of the other, and make them fast, as for leading or tying up, leaving three or four feet of rope between the inner horns; turn them into a field free from trees.

"Let them run, pull and haul till they are tired of it, and they will walk side by side and feed together. Then take off the rope, and they will ever after lead with the docility of a child, even though the first occasion may be years afterwards. It is much easier than for a man to be jerked all around by a wild heifer or steer, and more effectual."

Cutting Ice for Cattle.—On many farms cattle during the winter are supplied with water by cutting holes in the ice of ponds or creeks, which is a very convenient method, but attended with more or less danger if caution is not exercised. After continued cold for a week or two, water is apt to recede beneath the ice from the banks, and the whole surface becomes concaved, endangering the lives of animals that may venture upon it to drink.

A creature that has once slipped upon the ice is extremely cautious thereafter, and will not make another venture unless driven to by thirst. Farmers should take the precaution to avert danger by giving the ice a coating of ashes or sawdust. Because an animal does not choose to go upon ice to drink is no sign that such an animal is not thirsty; often they suffer through fear, as before stated, and cannot thrive under such circumstances.

Soiling Farm Stock.—I do not believe the time has yet arrived when soiling stock in this country of cheap land, as a general rule, will pay. There may be cases where it may be advisable; for instance, near large towns where land is high and a good market for beef, milk, butter and cheese is afforded. The common grasses with rye, corn and oats sown at different dates are good soiling crops. I should not tether cows in a yard; better make cheap stalls and have them well ventilated.

Winter Stabling of Cows.—As soon as the cows are turned out, remove the excrements and scrape the floor until it is perfectly clean, and leave it

without litter until just before the cows or cattle are to be tied up for the night. The floor will dry quicker if left uncovered than otherwise, and then there will be no danger of litter being frozen down.

Where the stable cleaning is not well performed, particles of manure become frozen to the floor as solid as stone, and are a constant annoyance until warm weather comes. Like the rolling of a snow ball, more and more becomes added to the obstructions upon the floor, until the animals have to lie upon a rough surface, and double the time spent every morning in trying to clear out the impediments that is ordinarily required to do the work of stable cleaning complete.

Before the stock is returned, give the floor a good coating of cut straw, chaff, or something of the kind ; this will prevent the animals from slipping and also keep the droppings from coming in direct contact with the floor, so as to freeze down. Where manure becomes frozen down, as it will sometimes in extreme cold weather, in spite of the precautions used, take an old ax and remove it at once, and apply a double amount of bedding until there is a change in the weather. As a rule, never neglect the stables, for the least work is required when every morning the labor is performed in the best possible manner.

Summering Swine in Pens.—Swine kept in pens during summer should have a chance to get at the earth and be provided with a water trough of sufficient size to allow the hogs to wallow. Keep the pen sweet and clean, as on this depends very much the prosperity of the hogs, although they are generally considered filthy animals. Vegetable matter should be given daily ; it is a good plan when weeding the garden to throw purslane, pig weeds, etc., into the pen. Charcoal and forest leaves, or straw cut fine, make a good deodorant and absorbent for the sty.

Storm Shelters for Stock in Pastures.—The following very humane suggestion was made by Horace Greeley, in his talks of what he knew about farming :

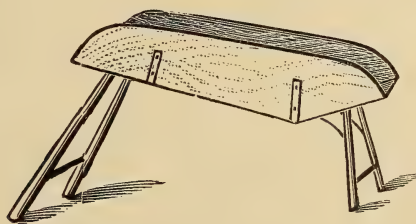
“ I think each pasture should have a rude shed or other shelter whereto the cattle may resort in case of storm or other inclemency. How much they shrink as well as suffer from one cold, pelting rain, few fully realize ; but I am sure that ‘ the merciful man who is merciful to his beast,’ finds his humanity a good paying investment.

“ I doubt that the rule would fail, even in Texas ; but I am contemplating civilized husbandry not the rude conditions of tropical semi-barbarism. If only by means of stakes and straw, give cattle a chance to keep dry and warm when they must otherwise shiver through a rainy, windy day and night on the cold, wet ground, and I am sure they will pay for it.”

Chair for Holding Sheep.—A chair, as here represented, can be constructed by any farmer, for holding sheep while tagging or trimming feet. The

chair can be made so as to expand or contract to fit any sized sheep or may be made solid, which will answer every purpose where the sheep are nearly of the same grade. But ten feet of lumber is required to make a chair, and no more tools than are generally found with an enterprising farmer.

Take a board ten inches wide and twelve feet long, and cut it into three parts four feet long. Shape the sides of two boards as shown in the engraving, then saw off the bottom board beveling, and put together again, so as to conform to shape of bottom. Put two cleats on the bottom for legs to pass through, and



CHAIR FOR HOLDING SHEEP.

use iron braces in front. To make the chair so that it can be extended, nail on but one side; to the other, attach two cleats to extend beneath the chair and stay them with right angle irons screwed on. Have the cleats work in wooden slots, with a pin through the lower end of slots, and notches in the cleats, so as to set on to the pins. To change the side, slip it upward or backward, and when free draw it outward as far as desired, and shove it down again, so that a new set of notches come upon the pins.

A sheep is placed in the chair in the best possible position for tagging or trimming feet, and no outlay of strength or uncomfortable position is required of the operator, for all the labor is performed while standing erect, and with no sheep to hold. The sheep is in no way confined by any rope or strap fastening, but sits in a perfectly easy position. It can be placed in the chair without being lifted bodily up, and set upon its feet again without handling or throwing at all.

The sheep chair is an invention of my own, for which I hold letters patent, but it is given here for the benefit of the purchasers of this work who may need it.

How to Shear a Sheep.—One well experienced submits the following as his way of taking the fleece from a sheep: "Place the sheep on that part of the floor assigned, resting on its rump and yourself in a posture with one knee on the floor and the back of the sheep resting against the left thigh. Grasp the shears about half way from the point to the bow, resting the thumb along the blade, which affords better command of the points. Commence cutting the wool at the brisket, and proceed downward upon the sides of the belly to the extremity of the ribs, the sides of both thighs to the edges of the flanks;

then back to the brisket, and thence upward, shearing the wool from the breast, front and both sides of the neck—but not yet the back of it—and also the poll or forepart and top of the head.

“Now the jacket is opened and its position, as well as that of the shearer, changed by being turned flat upon its side, one knee of the shearer resting on the floor and the other gently pressing the forequarter of the animal to prevent any struggling. Resume cutting from the flank and rump, and thence onward to the head. Thus one side is completed. The sheep is then turned on the other side, in doing which great care is requisite to prevent the fleece being torn, and the shearer acts as upon the other side, which finishes.

“Take the sheep near the door through which it is to pass out, and neatly trim the legs, and leave not a solitary lock anywhere as a harbor for ticks. It is absolutely necessary to remove from the stand to trim, otherwise the useless stuff from the legs becomes intermingled with the fleece wool. In the use of the shears let the blades be laid as flat to the skin as possible, not lower the points too much nor cut more than one or two inches at a clip, frequently not so much, depending on the part and compactness of the wool.”

Killing Ticks in Lambs.—After shearing sheep, ticks leave them on account of exposure and go to the lambs, and a good opportunity is afforded to destroy them. They may be fumigated as described under head of “Fumigating Tube,” or killed by immersing the lamb in tobacco juice, made by steeping a pound of plug tobacco to each six gallons of water. Morrell says a half hogshead will be the best thing for the deposit of the liquor, upon one side of the top of which should be fastened a rack to rest the lambs after the immersion, in order that the liquor may drain from them. If this is not done much of it will be wasted. The lambs must be held by the head with both hands, and then dipped to the ears, using great care that none of the decoction passes into the mouth or eyes. Some flock masters feed sulphur to sheep with salt, and claim to drive off the parasites in that way.

How to Dock Lambs.—The operation should be performed by two persons. One holding the lamb between his knees while sitting, the other doing the cutting. The holder should slip the skin of the tail upward toward the body at the time the bone is severed. This will prevent exposure of the bone, as the skin will cover the end and heal rapidly. After severing the tail, thoroughly tar the stub. This substance will cement the wound by adhesion to the wool, and prevent the depredations of flies. Sharp pruning shears are the best instruments for docking; a chisel and block next best, but if neither of these are at hand, use the knife with care.

Where the lamb is held by the tail, and pulling as that member is severed, the result is a protrusion of the bone, and an opportunity afforded for the maggot fly to deposit its eggs. Besides this, an unsightly tail will be the result of such barbarous treatment,

FARM MEASUREMENTS.

Estimating Bulk Hay.—In estimating hay in the stack or mow, the quality should always be taken into consideration. Ordinary meadow hay will require, at the top of the mow, about five hundred cubic feet to the ton, and the bottom of the mow about four hundred and fifty feet.

To Estimate Corn and Vegetables.—Multiply the length, breadth and depth in feet, and that product by four; cut off the right hand figure, and those at the left express the number of bushels of corn if the ears were shelled. Add one-half of this amount, and you will have about the quantity of bushels of vegetables in the same space.

To Measure Bulk Wood.—To measure a pile of wood, multiply the length by the width, and that product by the height, which will give the number of cubic feet. Divide that product by 128, and the quotient will be the number of cords.

A standard cord of wood, it must be remembered, is four feet thick; that is, the wood must be four feet long. Farmers usually go by surface measure, calling a pile of stove wood eight feet long and four feet high a cord. Under such circumstances thirty-two feet would be the divisor.

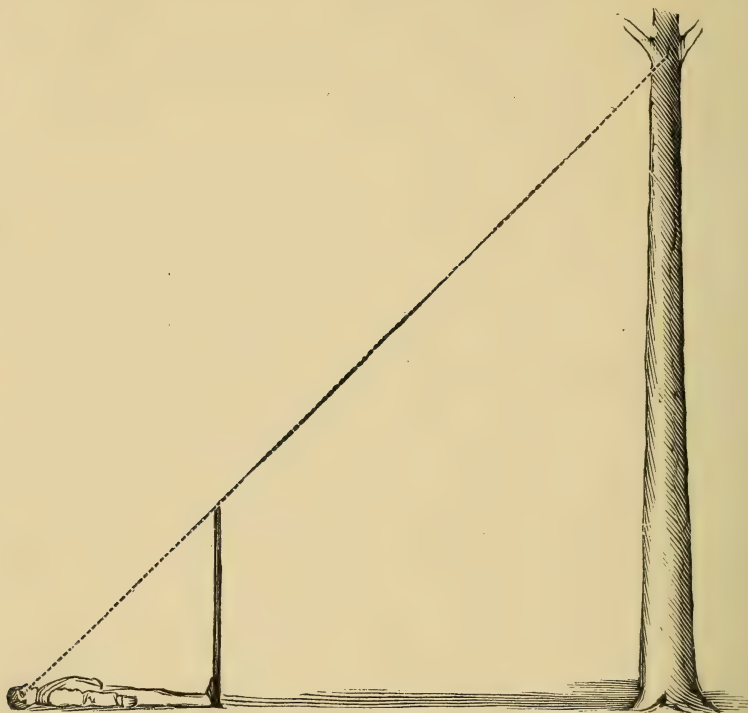
To Measure a Cistern.—First get the area of the circle. This may be done in two ways. Multiply the diameter and half diameter by half of the diameter; this gives the superficial contents of a circle very nearly. For instance, if the cistern is six feet across multiply that diameter by itself and half itself, which is nine, by half its diameter, which is three, and the result is twenty-seven.

Again, three-quarters of the square of the diameter will give the area. Suppose the diameter of the circle is six feet. Multiply six by six—thirty-six, three-fourths of which is twenty-seven, the number of square feet contained in the circle. Now to get the number of barrels the cistern will hold, multiply the area by the number of feet in depth and divide the product by five. This is estimating a barrel to hold thirty-one and a half gallons, which is near enough for ordinary purposes. (See page 105.)

To Measure the Height of a Tree.—When a tree stands so that the length of its shadow can be measured, the height of the tree may be readily ascertained as follows: Set a stick upright near the termination of the shadow of the tree. Mark the extremity of the shadow of the stick, and what the shadow is to the length of the stick so is the length of the tree's shadow to the height of the tree.

Another Method.—When a stick of timber is desired, and one is uncertain whether or not the tree will work the required length, a very close calculation can be made by the following simple plan: Say the stick required must

be fifty feet long, measure fifty feet in a direct line from the foot of the tree on as near level ground as possible; put down a small stake, then measure back toward the tree as many feet as the man is tall, and set a stick just the height of the observer's head; then let the observer lie flat on his back, his feet against the tall stake and head at small stake in line of tree and high stick, and sight directly over the top of the stick, and where the line of vision strikes the



SHOWING HOW TO MEASURE THE HEIGHT OF TREES.

tree will be fifty feet, or near enough that length for all practical purposes. The illustration shows process required. The stake should be the exact height of the man, the distance from eyes to top of head to offset distance from eyes to back of head when observer is lying down.

Simple Land Measures.—When it is desired to measure off an acre of land in any field, find the number of rods across the field and divide one hundred and sixty by that, and the result will be the number of rods wide required. For instance, if the lot is sixteen rods wide, the number of rods the other way will be ten, as sixteen is contained in one hundred and sixty, ten times.

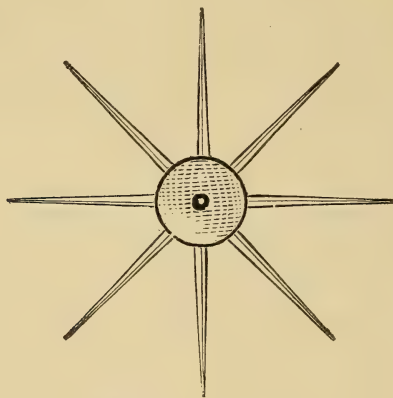
The number of square feet in an acre is 43,560. The following table will be found convenient and may be depended upon as accurate :

10 feet wide by 4356 feet long, contains.....	one acre.
15 " " " 2904 " " "	one acre.
20 " " " 2178 " " "	one acre.
30 " " " 1452 " " "	one acre.
40 " " " 1089 " " "	one acre.
50 " " " $871\frac{1}{5}$ " " "	one acre.
60 " " " 726 " " "	one acre.
70 " " " $622\frac{2}{7}$ " " "	one acre.
80 " " " $544\frac{1}{2}$ " " "	one acre.
90 " " " 488 " " "	one acre.
100 " " " $435\frac{6}{10}$ " " "	one acre.
110 " " " 396 " " "	one acre.
120 " " " 363 " " "	one acre.
130 " " " $335\frac{1}{3}$ " " "	one acre.
140 " " " $311\frac{1}{7}$ " " "	one acre.
150 " " " $290\frac{6}{15}$ " " "	one acre.
160 " " " $272\frac{1}{4}$ " " "	one acre.
170 " " " $256\frac{4}{17}$ " " "	one acre.
180 " " " 242 " " "	one acre.
190 " " " $229\frac{5}{19}$ " " "	one acre.
200 " " " $217\frac{4}{5}$ " " "	one acre.

Measuring with a Pole.—Land may be measured very accurately by means of a pole if a strip of tin or a table knife is used at the end to mark distances. If stakes are used, the outer surfaces should be exactly even with the end of the pole; if stuck at the end flush, several inches variation will be made. A pole sixteen and a half feet long is commonly used, but one eleven feet long will be handled with greater ease, counting three lengths of the pole as two rods measurement.

The Reel Measure.—A reel for measuring land is made as follows: "Take a round piece of board about an inch thick, and saw eight radiating spaces into it, shaving the wood between the saw cuts out with a sharp chisel, then lay in strips half-inch thick, two inches wide and thirty-five inches long, and screw them in. Then screw on another round piece of board and the hub will be complete. The radiating strips or spokes should be fitted with accuracy, so as to be firm and the points at equal distances. Saw off ends so each spoke is exactly thirty-two and a half inches long from center of hub to end; then measure from point to point, and if all are accurately twenty-four and three-quarter inches apart, the measurements of the land will also be correct, eight times twenty-four and three-quarter inches being sixteen and a half feet. It is best to drive a nail lengthwise into the end of each arm or spoke, then whittle it down small, as this will prevent the point from wearing off and becoming ultimately too short

"A straight, smooth piece of round rod iron, with a screw and nut on one end, is then inserted for an axle, and two strips of board placed on each side to receive the ends of the axle. A washer made of sole leather may be placed on each side of the wheel and inside the strips of board. These two strips have blocks placed between them to keep them at suitable distances apart, and a cross bar is passed through the rear end for a handle.



THE REEL ROD MEASURE.

"For measuring farms of moderate size, this will be sufficient, with the addition of a strip of red cloth on one of the spokes, so that each revolution may be easily counted by the operator as he pushes the machine before him.

"This machine may be made of pine, which is light and sufficiently stiff, but the arms or spokes should be of oak or other hard wood. If they are half an inch thick and two inches wide at the hub, tapering to an inch or less at the outer end, they will be quite stiff enough. Any ingenious farmer who has a workshop will readily make one.

"The measurements will, of course, be nearest correct on smooth, hard ground. On a freshly plowed field they will be attended with considerable inaccuracy, and should be made after the field is harrowed and settled. On a smooth surface there is rarely a variation of half an inch to a rod, and on ordinary farm ground or grass, not more than an inch, if well made. It is always advisable to prove the work on a piece of measured ground, to see if the spokes are of the right length."

Measuring Box.—A rule is given which says that a box sixteen by sixteen and three-quarters inches square and eight inches deep will contain a bushel, and each inch in depth of this box will contain one gallon. Every farmer should have such a box. This rule is very nearly correct, as $2,150\frac{1}{8}$ cubic inches make a bushel. A cylinder eighteen and a half inches in diameter and eight inches deep makes a bushel also.

CONSTRUCTION OF FISH PONDS.

To Make a Dam.—Dr. J. H. Slack, who has had not only an extended but an expensive experience in the culture of fish, says that in the construction of a pond no wood should be used at all. In building a dam, first lay up a line of brick extending to within an inch or two of the line of the top of the dam. Now pile your dirt on each side of the wall and you can bid defiance to the muskrats, which have often in one night destroyed the accumulated fishes of years. Do not trust to planks; the vermin seem rather to enjoy eating their way through them.

Dimensions of the Wall.—The proportions of the dam should be as follows :

Let the breadth on the top equal the height, and the base be three times the height. Thus, if your dam is ten feet high, let the width of the top be ten feet and that of the base thirty feet. Face the sluice-way with stone or brick, and let it extend to the bottom of the pond.

Place at the outlet two sets of screens of galvanized iron wire, the uppermost being for the purpose of catching the leaves, sticks, etc., which may find their way into the pond, the lower to prevent the escape of the fishes. One inch mesh for the upper and one-half inch for the lower will be about right. Arrange these so that they can be readily removed and cleaned, and then keep them clean.

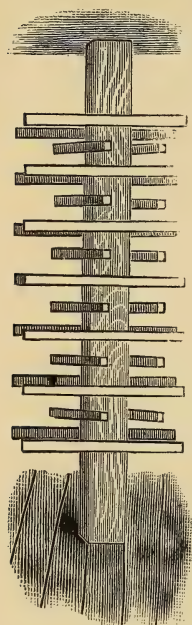
Excavated Fish Pond.—It is useless to attempt to raise fish of desirable species in a pond of dead water, so the site should always be where the pond may be constantly fed and drained by a stream of water. At the point on the watercourse where it is desirable to have the fish pond, perhaps simply damming the stream would not form a pond, but make an unsightly overflow, and an excavation is necessary. To dig the pond hole, mark off the sites with pegs, then take off the top or surface soil, and remove to some distance beyond the line; then dig out to any depth desired, gradually sloping from the edge to the water.

Any portion of the excavation not retentive should be well filled with puddled clay—*i. e.*, clay made of the consistency of putty, and thoroughly worked, by means of wooden rammers with rounded ends, not less than twenty inches in thickness.

The soil excavated may be used upon the dam. Make the top as level as possible and with well defined edges. Its sightliness may be improved by decking the margin with shrubs and flowers, and better still will it look if the margin, at least upon the side of approach, is well bestrewn with cobble-head stones. If the soil is clay, pound the excavated surface full of coarse pebbles and cover again with loose stones and gravel.

DAIRY UTENSILS.

Improved Cheese Press.—Where but few cheeses are made, it is not absolutely necessary to buy a cheese press. A very good long lever press may be constructed by simply using a twelve foot scantling as a lever, one end passing beneath a cleat upon the wall of the room. A good, firm platform should be used for the hoop, and blocks of different thicknesses provided to make proper adjustment of the lever during the process of pressing. As the follower settles, the lever will pitch or incline, then a block should be placed beneath the cleat to bring the lever to a horizontal position again. Add weights gradually as the pressing proceeds.



RACK FOR MILK PANS.

Rack for Milk Pans.—Where the milk room is small a great economy of space may be made by setting a post six inches square, and nailing cross cleats made of strips an inch and a half wide and half an inch thick. Allow the strips to extend each side, beyond the post, sufficiently to hold a milk pan. The cleats should be about eight inches apart. By reference to the engraving, a good idea of construction will be obtained. Another advantage besides that of economy of space is in the free circulation of air around and beneath the pans.

Renewing Pail Bails.—The bails of milk and slop pails about the dairy not infrequently lose the ears of the bail by breakage, and the pail has to be carried between the two hands, because the owner has no sheet or hoop iron to repair with. Leather for pail ears answers a good purpose. Take a strip of harness or boot leather one inch wide and three inches long, punch a bail hole with a round instrument through near the top, and tack it on with small nails, or fasten with small screws. If the leather is good, a pair of ears will last a year or more. Pieces of old boot tops answer well.

Small nails or long tacks may be annealed so as to clinch by simply heating them red hot and dropping them into cold water. Where hoop iron is at hand, a more sightly bail ear may be made. Cut the iron out with a cold chisel and file the edges smooth, then punch by heating.

Scalding Milk Vessels.—The plan of scalding milk pails, pans, etc., before they have been perfectly cleaned, is often the cause of having tainted milk. The creamy deposits made along the seams of the vessels coming in contact with boiling water, is cooked and made doubly adhesive, and after a

time putrefies, and a very little of this substance will contaminate gallons of milk. The spongy bottom of a wooden milk pail will retain oily globules as well as seams in tin vessels.

To Purify Dairy Utensils.—A practical farmer says that the best method for cleaning vessels used in the dairy is to stand on end in a convenient place for use, an open ended vessel of suitable dimensions for the size of the dairy, say from half a barrel to a hogshead. In this slake some good quicklime, enough to make a thin whitewash when full of water, and cover to keep out dust and dirt. The lime will settle, leaving a saturated solution of lime over it, as clear as spring water.

After using the milk pans, etc., wash them as other utensils are washed and rinsed ; then dip them in the adjoining cask of lime water, giving them a quick turn, so that every part becomes immersed therein ; set them to drain and dry, and the purification is complete, without any scalding process, from the new pan to the old worn out one.

The lime in the clear water instantly neutralizes the acidity of the milk yet remaining in the cracks or seams, etc., of the milk vessels, to destroy which the process of scalding has been performed. In the case of a very small dairy, or of one cow, the clear water may, if preferred, be dipped out for the time being and poured gently back again, the lime purifying the water and keeping it good all summer.

Of course there will be a little waste and evaporation, which will be made up by adding clean water as needed, the lime settled in the bottom of the cask keeping up the strength of the saturated solution.

Painting Milk Pails.—For painting pails inside Spanish whiting should be used instead of white lead, for the latter is poisonous. If for barn use, nothing is better than yellow ocher. This is harmless and durable. It will stand hot water better than any other suitable material.

Shellac for Milk Pails.—Unpainted wooden pails may receive two or three good coats of gum shellac varnish, dissolved in alcohol, well laid on both inside and outside. This will last a year or more before the wood will begin to soak water. It is much better than lead paint for the inside of pails. Lead is poison, and soon peels off in freezing weather, and then the pails soak water and get very heavy to lift ; besides they rot fast and leak through the pores of the wood. Shellac can be procured of any painter or at any paint store ready mixed, and, if corked tightly, will keep any length of time.

To Keep Milk Vessels from Drying Up.—Pails saturated with glycerine will not shrink and dry up, the hoops will not fall off, and there will be no necessity for keeping these articles soaked. Butter tubs keep fresh and sweet by use of it, and can be used a second time.

Pail Holding Milking Stool.—In my dairy I never adopted a pail holding stool, although I tried several styles. If a cow is at all inclined to be

uneasy, I prefer to have the pail between the knees, where it can be managed any instant. There are dairymen, however, who do like the holders. One of these writes: "I make my milking stool of a board or plank two and a half feet long and eight inches wide, with two legs in one end, and one in the other. The end with one leg is put under the cow, to set the pail upon to keep it out of the mud or dung and bring it nearer the cow's bag, while you sit upon the other end. This is a great improvement upon the common short stools, and though a small matter, is of considerable importance in a dairy."

Another recommends a stool very similar. Take a piece of board about eight inches wide and two feet long; nail short pieces across the ends to increase its strength and to bore holes through; put two legs in one end eight or ten inches long, and one in the other or forward end a trifle shorter. Place the stool where you want to sit, the end with one leg in where you usually set the pail.

Place the pail on one end of the stool and sit on the other; there you have your pail out of the dirt, and the cow cannot easily put her foot in it, as is so often the case when the pail is on the ground. If the legs prove too long, saw them off a little. Some cows are so low that you are obliged to set the pail on the ground; in such case you turn your stool around.

Another Style.—Another farmer recommends the use of hoop iron inch and a quarter wide for making the holder. "At about ten inches from one end make a notch in one edge with a cold chisel. Place the shoulder of the notch on the front side of the bail ear of the pail, and hold it there with one hand while the other bends the iron around the bottom of the pail at such a point that it will not move either way; then carry it up to the opposite bail ear and make another notch, leaving an end ten inches long, as on other side. Now take a separate piece of iron, two inches long, and make a hole in one end with a punch before cutting it, in the right shape for a hook, with a chisel.

"When made, place the hook part on the opposite side of the bail ear, bring the eye down on the main iron and make a hole to rivet them. Care should be taken in making the hole, that the hook will hook on and remain there while used. Lastly, bend the tops to half circles, to rest on the person's legs."

MAKING AND KEEPING CIDER.

Apples for Cider.—There is just as much difference in the quality of cider as in molasses, wine, beer, or any other liquid material made for family use; but not one-half the attention is given to making a good article that there should be. It is too generally the custom to gather all the refuse of the orchard and grind up rot and worms, and call the juice obtained good cider, but it comes far short of it.

The apples should be clean and ripe when picked, and of good variety. Crabbed sour apples will make cider of the same nature. Apples are better to be stored awhile in a bin or large pile before grinding. Rotten apples should be rejected, and also leaves, sticks and all other foreign substances. Where apples are knocked off with a pole bits of twigs are very likely to be intermingled, and these will impart a bitter taste to the cider. Many rotten apples will impart a flat or musty taste.

Managing the Pomace.—The introduction of little portable cider mills has been a damage to the quality of the cider—not absolutely of necessity, but because the cider maker was tempted to press off his pomace as fast as it came from the mill. Cider making, like cheese making, is not entirely a mechanical process, but partakes largely of the chemical; there is a nicety of chemical ripening in the pomace of the cider maker, as well as in the curds of the cheese maker.

Whatever mill is used for grinding the apples, to secure a good cider the pomace should not be pressed out under six hours after grinding; by keeping the whole together in this way the free juice acts upon the more fixed aroma of the pulp, seeds and skin, so that when it is pressed out it takes the soul of the fruit—so to speak—along with it; whereas, if pressed as soon as ground the juice is thin, watery and destitute of aroma, and that peculiar fruity body which makes good cider such a luxury.

How to Keep Cider.—There are all sorts of recipes offered for keeping cider sweet, but nearly every one of the preservers kill the life of the liquid and make a sub-acid drink that is neither palatable nor healthy. Mustard seed is more popular than any other substance for keeping cider, and is, probably, when used properly, as good as anything, but I prefer no drugging.

Pure cider kept in a cool place will remain sweet for a long time if not exposed to the air. Cider becomes sour by exposure to the atmosphere, therefore as long as a barrel is kept full and bunged up tight it will keep good, but as soon as a few quarts are drawn off the vacuum is filled with air, and acid is generated, which will increase each day thereafter until vinegar is formed.

Oil is recommended to prevent action of air upon the vacuum surface. As soon as a few gallons have been drawn out, pour into the bung hole about half a pint of clear sperm oil, or sweet oil if it is preferred. It should be warm when poured in, and it will spread in a thin coat over the surface, and keep spreading as the cider is drawn out, and thus exclude the air, without giving any taste of oil to the cider.

Second Method.—Another way practiced by some, and a very good one, is to store the barrels in the cellar, take out the bungs so the fermentation will work over, and keep the casks filled so the fermented pomace will all go over and not settle in the bottom to hasten a second fermentation and give you a premature hard cider. For a nice beverage, as soon as the vinous or first fermentation ceases, rack off the liquid into clean casks. Fill full and bung up tightly.

Third Method.—Take your cider when two days old, run it off through a filter box into a perfectly clean barrel, let it stand twenty-four hours after bunging up; then repeat the same process again, and if it should show any signs of fermentation the following day run it through your filter again, until you are satisfied beyond a doubt that your cider is free from pomace or sediment, and I will guarantee you as good cider as ever was tasted. I have partaken cider five years old, as pure as anything could be in a liquor state, preserved in this manner. Be sure and have your barrel clean.

Fourth Method.—Place the kettles of cider over a fire and bring them just to a boil, but do not let them boil. Skim it; fill the barrels to within an inch and a quarter of the bung; then bung them so tight that the air will be entirely kept out. Cider put up in accordance with the above directions will keep till the 1st of June, it is said, as nice as when first opened.

Fifth Method.—Let the new cider from sound and ripe apples go through the process of fermentation from a few days to three weeks, according as the weather is warm or cool. When it has attained to a lively fermentation, add to each gallon one-quarter of an ounce of sulphite of lime. In mixing fill a bucket partly full with the cider, and then add the sulphite of lime, and stir until intimately mixed; then pour this, which will be of a milk-like consistency, into the cask of fermenting cider. Agitate briskly and thoroughly for a few moments, and then let the cider settle; when (which will be after a few days) the cider has become clear, draw off and bottle carefully, or return again to the cask after the sediment has been removed. If loosely corked or kept in barrel on draught, it will retain its taste as a still cider.

If preserved in bottles, carefully corked, which is better, it will become a sparkling cider, and may be kept a great length of time.

A common sized barrel will require about half a pound of the sulphite of lime. Be particular and buy of your druggist sulphite of lime, not sulphate.

Sixth Method.—As soon as convenient after the cider is made, and at no time later than twenty-four hours thereafter, put in each barrel of cider one-half pound of ground mustard and one pound of horseradish, well pounded. Crushed raisins and whisky are also used after racking off the cider.

The Casks for Cider.—The cider once pressed out, should be stored in casks absolutely clean and free from taint of mustiness. Musty casks, if to be used at all, should have something more than a rinsing of cold water. Let them be thoroughly soaked and scalded, and then fumigated with brimstone. It is poor economy to put good cider in foul casks to be spoiled.

Canning Cider.—A correspondent claims that cider if taken when first made, brought to boiling heat, and canned, precisely as fruit is canned, will keep from year to year without any change of taste. Canned up in this way in the fall it may be kept a half a dozen years or longer as good as when first made.

It is better that the cider be settled and poured off from the dregs, and when

brought to boiling heat, the scum that gathers on the surface taken off ; but the only precaution necessary to the preservation of the cider is the sealing of it up air tight when boiling hot.

How to Bottle Cider.—The first run of the cider from the press is the best. Let the cider work a day or two, the casks being full, so that the pomace may pass off at the bung hole. Then take an empty cask, clean and sweet, put into it ten gallons of the cider, thrust into the cask through the bung hole an ignited rag sulphur match, suspended by a wire from the bung, to which it is to be attached ; and after this another, and so on, till three or four matches have been consumed. Then shake the cask violently, until the fumes of the sulphur are completely incorporated with the cider.

Pour the cider thus prepared into the cask in which you propose to keep it for the winter. Repeat the same process until your cask is full. Bung the cask tight, and let it remain in the cellar till March, and then draw the cider off and bottle it. Place the bottles upon the bottom of the cellar and cover with sand. Some place the bottles bottom up in a trench or betwixt two bits of joists, as in this way the corks will remain secure without twine or wire.

Boiling Cider to Preserve It.—The cider is boiled and skimmed, then put while hot into a tight cask or barrel, and sealed as in canning fruit ; before sealing suspend about half way in the barrel or cask, by a string from the bung hole, a small bag about the size of a hen's egg containing mustard seed ground fine.

Cider for Immediate Use.—In cold weather cider for immediate use will keep best by leaving the barrel out of doors, adding nothing to the liquid. It ferments very slowly when chilled, and a most excellent beverage can be enjoyed by drawing from the barrel as wanted. Plug the air hole each time after drawing.

Coloring Cider.—To give the cider a rich color, blood beets are sometimes ground up with the fruit, and then crushed horseradish root added as the cider is barreled.

To Purify Cider Barrels.—New barrels are best for cider unless the old are thoroughly cleansed. A very good way to purify a cask is to put into it from four quarts to a peck, according to size, of powdered charcoal, a coffee-cup of saleratus, then fill the barrel full of boiling water ; cover and let it remain until the water is cold, then rinse thoroughly. For preparing new cider barrels, see page 120.

Faucet for Cider Barrels.—There is no economy in using wooden taps in cider barrels, as they are liable to break or get loose and cause leakage. A good, metallic screw faucet costs but a trifle, and may be operated even in the dark with safety. Before filling the barrels, fit the faucet to each, put in taps until the cider is to be drawn, then set the barrel on end, and put in the faucet.

PORK PACKING.

Barrel for Storing Pork.—In the preservation of pork very much depends upon the barrel. If this is not perfectly sweet the meat will almost certainly spoil. Do not use a cask that has been employed for any other purpose, and if meat has ever spoiled in a barrel set it aside for barn use and get a new one for pork. Some claim that a barrel in which meat has spoiled may be cleansed, but do not take the cleansed barrel, for loss may attend the experiment, which will be several times over the cost of a new cask for storage. For shape of a pork barrel, see page 121.

Packing and Salting Pork.—I have obtained from several old and reliable farmers their *modus operandi* for packing and salting pork. One says: "In whatever vessel you pack, put first a layer of rock salt an inch or more in depth. Then put in a layer of pork, packing it as tightly as possible. Fill all the crevices with salt, and put in next a layer of salt two inches in depth. Then another layer of pork, and so on, covering the last layer with three inches of salt. Let it stand twenty-four hours and then pour on sufficient cold water to cover the pork well. Place a weight in the barrel to keep loose pieces down under the brine.

"Keep the brine strong by occasionally adding more salt. If at any time it does not seem perfectly sweet, pour it off for the asparagus bed and put on fresh water and more salt. I never scald brine and always use rock salt."

Second Method.—"When all animal heat is gone, cut your side meat into pieces of from four to six pounds each, of a uniform width; cover the bottom of the barrel from one-half to an inch thick with good salt; pack a layer of pieces, sitting them edgewise around the barrel, from staves to center, and as closely as you can crowd them; fill all the cracks and crevices with salt, then cover the whole layer one-fourth or one-half inch thick, then place and cover another layer as before, and so on, until your pork is all in, or the barrel filled.

"Make a strong brine, using good, clean water, soft preferable, and as much salt as the water will dissolve, scald thoroughly and skim; wife says add one-half pound saltpeter—she always insists upon that; when brine has cooled, pour on to the pork enough to cover it well. A barrel properly packed takes about three buckets of brine, but if this does not cover, add cold water and keep the meat always weighted down and under brine.

"Salt is inclined to settle to the bottom; watch it during the year, occasionally throw in two or three handfuls of salt; no fear of getting too much. Follow directions and I warrant good, sweet pork as long as it lasts."

Third Method.—"Cut your side meat in strips about four inches wide, cover the bottom of your barrel with good coarse salt, then pack in edgewise a

layer of pork as close as you can get it, then a layer of salt, and so on, until your cask is full, using about twenty pounds of salt (Turk's Island is the best) for every one hundred pounds of meat ; then cover with brine as strong as salt will make it, being careful to see that it is always under the brine."

Fourth Method.—The directions of the fourth pork packer are to "let the meat become perfectly cold before packing ; put a good layer of coarse rock salt in the bottom of the barrel, then pack closely a layer of pork ; cover this with another layer of your rock salt, and so proceed. When your barrel is about full put on a weight sufficient to hold the meat in place, and fill up with pure cold water until the pork is well covered, and the work is done.

"There should be so much salt that you can always find it in an undissolved state in the barrel among the meat. If this is the case, and the meat is kept covered with brine, it will keep as sweet as possible and never want scalding."

Fifth Method.—"To a half bushel of good ordinary salt I add one-fourth of niter, pulverized and mixed well. When the animal heat is all out of your pork, and before it hardens, pack it down thus : First have a clean barrel well hooped, and a piece of board nailed inside the chine across the head below to keep the latter from bursting out. Set it under a beam in your cellar, give a coat of salt on the bottom of the barrel, then a layer of pork, then of salt, and so on, filling the side spaces as the barrel fills with pieces of pork cut to suit, and pressing every second layer gently with a maul so as to render it compact.

"When your pork is all in, the spaces should be closely filled with salt and left. Then fit a lid on the pork, on this a strong cross block, and cut a piece of scantling to reach from top of block to beam of cellar, and fit it in and wedge with an ax as tight as you can well drive, tightening up twice a week until the brine forms and runs over the pork, and it is done. In using, arrange so as to have the brine cover the pork. I use no water ; it is that which makes the pork rancid."

Sixth Method.—"The animal heat out, cut off the hams, cut the ribs loose from the backbone, remove the lard and ribs, take a small strip from the thin part. I also take a strip along the back so as to include the lean on both sides of the backbone, which goes for lard and sausage. Now commence next to the shoulder to cut in strips about four inches wide ; now you have it in suitable shape for packing and for the women folks to handle.

"Sprinkle about one-half inch of salt on the bottom of the barrel, set each piece on edge, skin next to the barrel ; pack close, pound down even all round. Put another layer of salt and meat till done ; salt on top, pour on strong brine until it rises over the meat ; always keep the meat under brine. The great secret in keeping meat is salt and neatness."

The uniform methods of packing meat, given in the foregoing contributions, make it quite evident that the ground is well covered. My own experience for

several years verifies the statements that abundance of good salt should be used.

Old Meat and Old Brine.—"If you have any old pork left over remove and pour the brine into something clean, and pack the new pork the same as above, with plenty of salt, and put in the old pork on top, and add the brine without scalding, and if it does not cover the meat add water sufficient to make it. Thus the old brine can be used year after year, and grows better every year.

"I have a barrel of brine that has been used for seven years, and it keeps the meat perfectly sweet and has never been skimmed or scalded. I never allow the meat to freeze before or after packing, but keep it in a cool, dry cellar."

Where to Keep Pork.—The pork barrel should be kept in a cool place. If the cellar is warm keep it up stairs; if that is warm also, keep it in the store room or granary. Extremely cold weather will have no effect upon it, but a warm atmosphere may.

To Cure Hams.—To every one hundred pounds take eight pounds of salt, four ounces of saltpeter, one and a half pounds of sugar, four gallons of water. The hams may be taken out after four weeks. To keep the meat after warm weather the pickle will have to be boiled. By using half the quantity of saltpeter the brine may be used for beef to be dried.

Second Formula.—"One pound of saltpeter, dried and finely powdered, one peck of Liverpool salt, one pound of brown sugar and one quart of molasses. Mix all in a vessel, rub the meat well with same, and pack with skin down. This amount is required for five hundred pounds of meat. After being in salt three to four weeks, take out, wash the pieces clean, dry them, and hang for smoking. Three weeks is sufficient to cure them thoroughly—by fire of hickory wood. When smoked take down and bag, or pack away in dry chaff or cut straw. Examine occasionally, and if found at all damp, renew the packing with dry material."

Third Formula.—"Pack your hams in a barrel, not too close, make a sufficient pickle to cover them. Seven pounds of salt, three ounces of saltpeter, six red peppers, to four gallons of water. Scald and skim; when cold pour on the hams; let them lie six weeks, then take them out and rinse them in cold water, hang them up, let them drain one day, smoke them with green hickory or sugar maple chips. In cold weather make a smoke twice a day, and in moderate weather once a day. I have tried this recipe for a number of years and know it to be good."

Fourth Formula.—"The meat, after being cut out, must be rubbed piece by piece with very finely powdered saltpeter on the flesh side and where the leg is cut off, a tablespoonful, not heaped, to each ham, a dessertspoonful to each shoulder, and about half that quantity to each middling and jowl; this must be rubbed in.

"Then salt it by packing a thin coating of salt on the flesh side of each piece, say one-half an inch thick ; pack the pieces on a scaffolding, or on a floor with strips of plank laid a few inches apart all over it, that is under the meat ; the pieces must be placed skin side down in the following order : First layer, hams ; second, shoulders ; third, jowls ; fourth, middlings. Take the spare ribs out of the middlings. The meat must lie in this six weeks if the weather is mild, eight if cold."

Fifth Formula.—"Half a bushel of fine salt, three pounds of brown sugar, two and one-half pounds saltpeter, one-half gallon best molasses. Mix these ingredients together, then rub each piece well with the mixture before wetting for pickle. The meat must be taken out of the pickle once a week for six weeks ; the two first times the meat is taken out there is to be a plate of alum salt added to the pickle."

How to Keep Cured Hams.—"I have tried various ways, and there are several that will keep hams sweet and sound not only through the year, but for two years. I have packed them in clean casks, first thoroughly sprinkling each ham with hickory wood ashes. No insect ever disturbed them. I have put them in strong muslin bags, sewed them up and hung them to spikes in the attic, well ventilated, and they kept well.

"I have left them in the smoke house, as dark as Erebus, locked the door and kept the key, and never knew an insect to trouble them, and they were always in fine condition. I have also put them in bags as before, imbedded in sweet cut hay, and they came out whenever wanted in the very best condition. In all cases they should be hung up in a dry, cool place."

Preserving Meat Without Brine.—A farmer says : "I take a hog weighing, say two hundred pounds, cut it down each side of the backbone, first removing the leaf lard and tenderloins and all parts containing blood ; then cut the legs off close to the ham, and lay the whole side on a board prepared for the purpose, and rub thoroughly all parts except the skin with fine Liverpool salt, then place the other side on the one already salted and treat in the same manner. I keep up this process of turning and salting for three or four days, always rubbing salt on the bare places.

"In three or four weeks the sides may be hung up in a dry room and require no further attention. The salting must be done within twelve hours after the animal is killed, before decomposition begins. The fine salt answers every purpose, and preserves the flavor of the meat so well that in six months after by placing a piece of it in a pot of cold water, and just allowing it to boil, then bake, it has nearly as fine a flavor as a piece of fresh baked pork. Two small sacks of salt are sufficient for two hundred pounds of meat."

The finest ham I ever tasted was cured by rubbing all sides daily with hot salt for two or three weeks and smoking with corn cobs. Buckskin gloves were used for rubbing with. For smoke houses and smoking, see page 344.

STORING VEGETABLES.

How to Keep Sweet Potatoes.—Select potatoes from medium to the largest size; the smaller ones generally dry up so as to be worthless in the spring. The next thing is to store them properly. Take old flour barrels or shoe boxes, or almost any vessel that is not so tight as not to admit the air. A tight barrel or box is unsafe and old salt barrels are ruinous, the salt every time rotting the potatoes.

Fill the barrel or box carefully, shaking them down, then cover the top with well dried sawdust, or dust from the road, or dry sand; or the soil they were raised in, well dried, will make a good covering. Then store them away in a room not subject to sudden changes. Be careful in storing, however, not to cover so close as to leave no opportunity for the sweat from the potatoes to pass off, for sweet potatoes are like other things; they will pass through a sweat, and if there is no chance for the moisture to pass off, they must rot.

The room must be kept warm by fire; you might as well throw them away at once, as to attempt to keep them in a cold climate without fire. The proper temperature is about fifty degrees by our common thermometers; though where you have a stove in your room the temperature may be raised to seventy or eighty degrees without injury, as the air is much easier warmed than the potatoes. In the spring, be not in too great haste to unpack and remove them.

Instances have been known where they have been kept for two years, being stored in a warm, dry cellar, near the furnace. Keep them away from all moisture. Unlike Irish potatoes, which need a cold situation to keep well, the sweet potatoes need to be kept warm and dry.

The time for keeping sweet potatoes in a warm room generally expires about the middle of April, but they can be kept and be good up to the first of October, when the new crop takes the place of the old one, by a proper treatment, viz.: About the third week of April, unless cold weather continues, remove the barrels of potatoes from the warm room to a cool, dry room on the north side of the house.

Another Method.—In summer, gather old forest leaves, and after thoroughly drying, then put them in a dry room until the sweet potatoes are dug. "To pack the vegetables, cover the bottom of the barrel with leaves one inch deep; then lay in the potatoes on the top of the leaves, packing them closely together; then put in more leaves on top of them—enough to cover them—and lay in more potatoes, and cover with leaves; continue layers of potatoes, and cover with leaves until the barrel is filled. After they are packed, the barrels may be placed in rotation of tiers about the room in which they are to be kept.

"The barrels may be set on top of each (or over each other) by laying pieces across the top of the barrels six inches high, and laying boards on top of pieces

to set the barrels on. The space between the barrels will make it convenient for taking out the potatoes as needed, and will give ventilation to each barrel, as the potatoes must be uncovered at the top of the barrel for the heated air to escape. They must not be closed at the top of the barrel, or they will rot.

"Immediately have a fire made in the room where the potatoes are to be kept, and the stove should set in the middle of the floor of the room, or near it as possible. The room should not be exposed to too much light—have it darkened with curtains at the windows, but it would be preferable not to keep them in a room that has windows on the north and west sides of the room.

"The general temperature of the room should be from seventy-five to eighty degrees for at least ten days after being packed, so as to keep them warm during the usual sweating process; for, should the room be cool (though not feel chilly), they will become damp, even wet; and being left in this chilled and wet state they will not keep, hence they must be kept in a room that can be heated with a fire from a stove.

"During the time of sweating the room must have air—have a window raised in the daytime; the curtain at the window should be rolled up, as it is not so important to keep the room darkened during the time of the usual sweating process; but after they are out of danger by sweating, it is best then to keep the room dark. After ten days expire (the time allowed for the usual sweating process, and in the temperature mentioned), it becomes important to keep them at uniform temperature, and they will not bear a lower degree than forty without injury."

Third Method.—A process is given by a farmer, which, if reliable, as he claims, it is much more economical than the first two processes given, provided one has the material required:

"Just put the sweet potatoes in a barrel when you dig them and mix dry earth among them. Lay the barrels on high ground, and cover them deeply with wheat chaff and let it rain on them all winter. No matter how cold or hot the weather, your potatoes will be sound in the spring. I have kept sweet potatoes in this way for fifteen years and always found them sound, unless the rats got into them."

Storing Irish Potatoes.—Potatoes are usually handled when being removed from the field to the cellar as though they were of no value whatever. They are shoveled into the cart and out again, then dumped by a slide-way into the bin; the skins broken, the flesh bruised, and the farmer wonders why his potatoes are not of good flavor, and why they do not keep well.

They should be handled with as much care as apples; the skins are given to protect the mealy part from the action of the atmosphere, and if broken, a chemical change takes place, which greatly deteriorates the original rich, fine flavor.

Storing Celery for Winter Use.—To store celery, I prefer what is known as the Henderson method, which, in substance, is as follows: "On a

dry day, about the last of November, select a place not far from the house, and the driest part of the ground ; dig a trench eight or nine inches wide, and as deep as the celery is tall, cutting the sides smooth and nearly perpendicular, and throwing the loose earth a foot or more out of the way on each side.

"Now dig away the earth from the sides of the row of celery and take up the plants carefully, so as not to break the stalks, leaving as much of the earth on the roots as will readily adhere ; carry them to the trench, and commencing at one end, set them in uprightly, close together, putting in no earth excepting barely to cover the roots, and observing that the tops of the leaves should not be over two inches higher than the sides of the trench. In this way continue till all is stored away.

"Now the aim is to exclude wet and frost and keep the plants damp and in the dark—but for a few days, at least, some ventilation is necessary ; so we first cover the trench rather lightly with dry leaves, which are plenty at this season, and over these a couple of boards nailed together at their sides, so as to form a roof to shed off rain or melted snow.

"After a week or two, take off the board covering and pile on leaves or straw about a foot in height, well pressed on, but not so as to crush the tops of the celery ; and on the sides place some of the loose earth that came out of the trench, beating it smoothly with the shovel so as to carry off the wet, then place the board covering again on top.

"By making an opening at the end of the trench and keeping a bundle of straw therein, the celery will be easily accessible when wanted, and if the supply is sufficient, will keep good till spring."

Another Method.—Remove the celery to high and dry ground, dig a straight trench spade deep, stand up a row of plants singly, then three inches of soil, then another row, and so on until about a half dozen rows are finished, when commence another bed, and so on.

The soil should be packed in firmly and banked up, so that the tops of the celery are just covered, then spank off roof-fashion to turn the rain. Over this two wide boards, nailed together, should be placed, as a security against moisture, or straw can be bent over and secured at the bottom with bean poles. Another plan is to sink barrels into the earth, so that the tops are two or three inches below the surface, then stand them compactly full of celery, without any soil. Put tight covers upon them, so as to exclude all moisture, and then a couple of inches of soil.

Storing Celery for Present Use.—You can put enough celery into the cellar for about a month's use. For this purpose, take a box or two about eighteen inches in depth—barrels answer as well—put a couple of inches of fine earth in the bottom and wet it till it forms a mud ; then, on a dry day, dig up some of the best celery plants carefully, so as not to break the stalks and leaving some of the dirt on the roots, set them upright in the boxes or bar-

rels as closely as possible, with the roots on the mud, but taking care not to wet the leaves or stalks. Then cover the top with an old cloth or sack, to exclude the light and prevent evaporation, but allow a little ventilation. Keep in a cool cellar, where it will not freeze, and it will be good for use for a month or longer.

Storing Cabbages for Winter.—Set the cabbages in rows upon the ground heads down and two or three abreast, no difference how long, and smooth the leaves, and crowd them in at the bottom; now cover with soil on each side of the row from four to six inches thick, according to the climate and the consequent severity of the winters.

If you have some quite loose or unripe cabbages, dig a trench as deep as the root-stalks are long; in this trench set your cabbage roots in the soil, and cover up to the heads or leaves, thus making all level with the surface, the heads alone above ground; now commence and fold the leaves over the small head or center and cover with soil deep enough to prevent freezing. If this is well done the cabbage will grow all winter and come out nice, well blanched and tender, and will grace the table and sharpen the appetite from February till May.

Storing Cabbage in Barrels.—A plan that recommends itself on the score of convenience, is to pack cabbage heads, stripped of all their green leaves, in barrels filled in with moist chopped straw, provided they are protected from the inroads of rats and mice in the cellar, and guarded against excess of moisture. In this way they are ready of access as the companion dish of salt pork, and need not depreciate with decay more than a barrel of winter apples. Care must be taken to select the hardest and soundest heads at the outset, and to remove them from their place of stowage before they have had time to sprout.

Storing Turnips and Beets.—Turnips and beets should usually be kept by burying in the garden. If put in the cellar they should be well covered with damp soil and not more than five bushels in a place or pile. If buried in the garden, put from ten to twenty bushels in a pile and cover so as to protect from frost.

MUSHROOM CULTURE.

Where to Grow Mushrooms.—It is not a difficult matter to grow mushrooms, and by a little painstaking they may be kept in good supply at all seasons of the year. They may be raised in a cellar in winter, in a shed in fall or spring, and in the open ground in summer. In the last mentioned season they may be produced with the least trouble; all that is necessary being to place the spawn in the virgin soil of fence corners,

To Make a Mushroom Bed.—Take freshly dropped horse manure unmixed with straw, and mix with it about one-fourth its bulk good loam from just beneath sod, and turn the compost and mix it up occasionally for two weeks. It is best to have it beneath a shed to keep it from the rain. About six wheelbarrow loads of this compost will be required to make a bed. After the manure is about half dried throughout it may be formed into a bed. Spread it six inches thick on the place where the bed is to be within a frame, and beat it down solid. Add six inches more, beat solid again, and so on until the bed is made. (It should be three to four feet in the winter, and one or two in the summer.) It should then be left to ferment. In a day or two it will reach a temperature of over one hundred degrees, gradually cooling down afterward. It should be watched until, by application of a thermometer, the temperature is found to be from 86 to 90 degrees, then it is ready for the spawn.

To Produce Mushroom Spawn.—The following is given as the most economical and certain way of producing mushroom spawn. You can procure the seed to start with from any wholesale seedsman at a trifling expense. You can also procure it artificially, but the surest way is to get a little of the spawn, if not more than half of a brick to begin with, after which it can be increased to any extent in the following manner: collect equal quantities of horse and cow manure containing no litter, straw, or other foreign material. If you do not want a very large quantity, a good full wheelbarrow load of each will be sufficient. Put these materials under a shed, add an equal quantity—that is, one load of fine old leaf mold, and if you can get sheep droppings, add the same quantity of this, but it is not essential to success. Now break all up fine and pass through a coarse sieve, adding water sufficient to make the whole mass about the consistency of thick mortar. Spread it out in a layer about five or six inches thick, and press it down firmly.

“As soon as it thickens or dries enough to hold together when handled, cut up into blocks the size of an ordinary brick, and in the center of each insert a small piece of the spawn which you have previously procured, stopping the hole made by the same material of which the bricks are made. Put the bricks upon edge, and in such a manner that the air can pass readily among them.

“The bricks need to be turned occasionally and kept in a very dry place until wanted for use. There is no danger of keeping them too dry. The spawn inserted will spread rapidly through every portion of these bricks, and each will become thoroughly impregnated the same as the one originally purchased.”

To Plant Mushroom Spawn.—To plant, the spawn should be broken into pieces the size of hens' eggs, and then placed three or four inches beneath the surface eight to twelve inches apart and covered up smooth and level. The bed must now be left for two weeks, by which time the spawn will have spread throughout the bed. Then, but not before, two inches of fine loam should be evenly scattered over the bed, and pressed down firmly with the back of the

spade, but not packed hard. Straw should then be placed over the bed loosely, and if the surface becomes dry, a gentle sprinkling of water should be given, heated to 100°. In the course of time, the interval depending on circumstances, the crop will appear and may be gathered for daily use. It is essential to keep up a temperature about 60° after planting the spawn, but light is unnecessary; in fact, darkness is preferable to light. It will be noticed that the mushroom of spontaneous growth comes up and develops chiefly in the night.

Indoor Mushroom Culture.—An open shed or a barn may be used for growing the fungus, the bed formed in boxes, or they may be produced in the cellar by making tight boxes or cutting barrels in half so as to form tubs, or old washtubs will do. Prepare the compost as for open culture and pack in boxes or tubs instead of beds. A good supply may thus be procured for winter use.

MANAGEMENT OF HEMP.

Harvesting Hemp.—The crop is usually gathered late in the summer. Its maturity may be determined by the leaves of the plant turning yellowish, but it is not a crop that demands early attention. It may stand until fully ripe, or be cut before showing very much of the yellow hue. “The plants are gathered by two modes, viz.: pulling them up by the roots, or cutting them off about two inches above the surface of the ground—the closer to the ground the better. Cutting is generally preferred, which is performed with a knife (often made out of an old scythe) or with a good reaping machine.

“Whether pulled or cut, the plants are to be carefully and evenly laid on the ground to cure, which in dry weather will take two or three days; a light rain falling on them while lying down is rather beneficial, as it will then be easier to remove the leaves, which should be done before the shocks are formed. When cured, the plants should be tied in small bundles, for convenience in handling, and set up in shocks, the roots or butt ends resting on the ground, and the tops united or tied by a band made of the plants. As soon as convenient the shocks may be collected together and formed into stacks, and by remaining in the stacks a sufficient time before being exposed to be rotted, the plants go through a sweat which very much improves the appearance and quality of the fiber.”

Dew Rotting Hemp.—“For dew rotting, the plants should be spread out some time between the middle of October and the middle of December. Winter rotting is preferable to autumn rotting, as it gives the fiber a lighter and better color. The plants may be spread on the same field where they grew, but on grass is better. The length of time they should remain exposed

depends upon the degree of moisture, and the temperature of atmosphere; when wet and warm, five or six weeks may be long enough.

"If the weather is warm, it should be spread at night, and heaped together in the morning, before the sun's rays have much power. In wet weather, it may be left on the ground during the whole day; and should the nights be very dry, it is better to water it.

"To ascertain if it is sufficiently rotted, take a handful, dry it, and break it by hand or on the brake; if the fiber can be easily separated from the stalk, it is rotted enough. If the plants remain on the ground too long, the fibers lose some of their strength, though a few days longer than necessary, in cold weather, will not do any injury. Snow rotting bleaches the fiber, improves the quality, and makes it nearly as valuable as if water rotted, provided the plants remain spread out long enough."

Water Rotting Hemp.—"For water rotting, the bundles are to be placed in a shallow pool or tank of soft, clear, running water, crossing each other, and pressed down by some heavy substance to prevent their rising to the surface, special care being taken that they are not so loaded as to be pressed down to the bottom. If the weather be warm, four or five days will generally be sufficient; if not, let them remain two or three days more, until the stem is so much softened that the outside coat will come off easily; care must be taken that the rotting does not proceed so far as to injure the fibers.

"The plants should then be taken out of the water and spread singly and regularly on the grass. When the hemp is thus spread out, it should be carefully turned two or three times a week, and lie on the ground from four to six weeks, when, by the influence of the rains and dews, the woody part of the stem will be decomposed and rendered brittle.

"Another, and probably the best method, is to take the plants from the shocks and immerse them in water twenty-four hours; then withdraw the water, and let the hemp remain in bulk until the generation of natural heat takes place, which will be in the course of about fifteen hours. After the plants are thoroughly heated, inundate or immerse them a second time, and let them remain until you are prepared to remove and dry them. This last method is recommended as producing an article which is bright, soft and lustrous, and remarkable for its weight and oily appearance, and is worthy of a trial.

"Among the English producers, rotting is regarded as taking place much more rapidly in stagnant pools than in running water or extensive lakes, in warm weather, than the reverse. The time requisite varies from five to fifteen days, even in stagnant water. The water in which hemp has been rotted, has a disagreeable odor and taste, proving fatal to fishes."

Pit Rotting Hemp.—"Another method of rotting hemp is by placing it in a pit, and covering it over with one foot of earth, after having watered it abundantly a single time; but even this method requires double the time of

water. After being rotted and rapidly dried, it is ready for breaking, beating, etc.

"These processes vary considerably, however, in different places, and the general operation may be said to be one of no little nicety and hazard. Thus it will be influenced by the strength and vigor of the plant, the moisture or dryness of the season, the temperature of the air during the process, as well as the soil from which the plant was produced. If the operation is carried too far, not only the woody matter, but the fibers also, will be destroyed or injured—and if not far enough, it has generally been thought that the article will not dress; and thus, after a good crop has been produced, it may be much injured, if not spoiled, in the incipient stage of its manufacture."

Bundling Rotted Hemp.—When the plants are rotted, they are to be dried and again tied in bundles and put under cover; they are then ready for breaking, which process, when performed by the hand brake, is the most laborious work in the preparation of hemp.

Yield of Hemp per Acre.—"The quantity of net hemp to the acre is from seven hundred to one thousand pounds, varying according to the fertility and preparation of the soil and the state of the season. The quantity which any field may produce may be estimated from the average height of the plants throughout the field—thus, if the plants average eight feet in height, the acre will yield eight hundred pounds of hemp, each foot in height corresponding to one hundred pounds of fiber."

PREPARING POULTRY FOR MARKET.

How to Kill and Pluck.—Discontinue feeding the fowls long enough before killing to have the crops become empty. If killed while full, the flesh about the crop will take on a bluish color that will damage the bird somewhat for market, as it will be less attractive. To kill take a very sharp, small bladed knife, hang up the turkey or chicken by the legs to a rope, fixed for the purpose, and as it opens its mouth, thrust in the knife and make a deep cut across the throat. After the blood has stopped running in a stream, place the point of the knife in the groove in the upper part of the mouth, run the blade up into the back part of the head, which will cause a quivering and twitching of the muscles; now is your time to pluck, for every feather yields as if by magic, and there is no danger of tearing the most tender chick it is said, and before it attempts to flap you can have it as bare as the day it came out of the egg. Pull out the feathers as rapidly as possible, yet carefully, so as not to tear the skin, taking only a few in your hand at once. If for home use cut off the heads and "pull" as soon as the fowl is dressed. Male birds may be dry

picked, with the feathers on around the head and the tip of the wings, also the tail feathers left in; the small or pin feathers should be all removed.

Scalding Fowls to Pluck.—A New York City poultry dealer suggests that for scalding poultry, the water be as near the point of boiling as possible without actually boiling; the fowl held by the legs, should be immersed and lifted up and down two or three times; the motion helps the hot water to penetrate the plumage and take proper effect upon the skin; continue to hold the fowl by the legs with one hand while plucking the feathers with the other, without a moment's delay after taking out.

If skilfully handled in this way, the feathers and pins may all be removed without breaking the skin. A broken skin injures the sale. The intestines should not be "drawn." If you prefer to take the heads off, the skin should be drawn over the neck-bone and tied. It should next be "plumped" by being dipped into water nearly or quite boiling hot, and then at once into cold water. Some think the hot water sufficient without the cold. It should be entirely cold before being packed. If one or two in the lot should accidentally get bruised or have the skin broken, sell or use at home, as they would hurt the sale of the whole lot.

Marking Poultry Boxes.—"The box should have the initials of the consignor, the number and variety of the contents, as well as the name of the consignee marked on it. The necessity for marking the number and variety of contents is, that in case the box is broken open and any portion of the contents taken out before delivery to the consignee, they will be enabled to make a correct bill for the missing poultry.

"Another advantage is, that the consignee knows by a glance at the box whether it contains the desired variety he wishes; if not, he need not open it, and the contents will not receive a needless handling; for some parties prefer a mixed box, while others do not, and all dealers prefer selling the entire contents of the box to one person, as it avoids error in weighing and keeping accounts."

Packing Poultry in Barrels.—When to be sent to market allow all of the animal heat to pass off before packing, but do not allow them to freeze. See that the surface is dry and clean. Apple and flour barrels, perfectly new, are considered by many as best to use, as the express charges will be less than if a box be taken which holds the same quantity; besides, a new barrel is always salable.

Rye straw is freest from dust, and therefore best for packing; put some in the bottom of the barrel, laying it on its side. Press the wings close to the body of the fowls and pack in circles round the barrel, alternating body and legs; put straw between each layer. When nearly full, lift up the barrel and shake down the contents. Pack as tightly as possible and as clean.

It is a good plan, says one dealer, to wrap brown paper around each fowl,

and thus keep it from contact with either barrel or straw. Cleanliness is very essential if you desire to receive the highest market price for your poultry; and the appearance of the fowls count as much, if not more, than the quality, although both are very desirable.

Packing Poultry in Boxes.—Place a layer of clean straw at the bottom; then alternate layers of poultry and straw; stow snugly back upward, legs under the body. Pack the boxes so as to prevent shifting or shucking. They ought not to contain over one hundred and fifty to two hundred pounds and if possible never put two kinds in a box. Mark on each box cover its contents, and the gross weight.

MANAGEMENT OF EGGS.

How to Keep Eggs Fresh.—The great secret in keeping eggs consists in entirely excluding the air from the interior. The lining next to the shell is, when in its natural state, impervious to air, and the albumen is calculated to sustain it, but dampness and heat will cause decay, and, if the egg is allowed to lie in one position, especially upon one side, the yolk sinks through the albumen and settles upon the lining, and, not possessing proper qualities for preserving this skin in a healthy condition, it dries and air penetrates and begins the work of destruction.

Where eggs are set upon their small ends the yolk is much less liable to reach the lining of the shell. Where eggs are packed in a barrel, keg or bucket, it is a good plan to turn the whole quantity on to a different side once in a while.

Egg Greasing Process.—I have a way of keeping eggs which, after testing very many different modes, I consider best, and that is simply to grease them over thoroughly and keep them cool. They have been kept in this way for many months and never found to change in the least.

I do not approve of the use of lime and ashes, for, in the first place, they have both proven to be failures, so far as very long keeping is concerned; and secondly, they injure the appearance of the exterior so as to make the eggs really unfit for market.

The liquid process is better, which is keeping the eggs in lime water well salted; but with this method, if an egg chances to be cracked or very porous, it will soon be spoiled; and, again, they very soon spoil after being taken from the liquid, if the weather or room is warm.

When eggs are greased, be very particular to have the coating over the entire surface, for if it is not, preservation will not be made perfect, and it is here that many have failed who do not approve of the greasing process. Another

thing of importance is to keep the eggs in a moderate and uniform temperature of atmosphere. It is better to have them dry and warm than damp and cold, but no state of atmosphere so soon destroys them as one warm and damp. I have never found any kind of coating, such as varnishes, so good as fresh lard.

Keeping Eggs in Oats.—Put on the bottom a layer of oats and set the eggs all point downward, so that not one touches the other, until the layer is full, then cover with oats and make another layer, and so on, until the box is full, and then cover and set in a cool, dry place where it does not freeze. Use small boxes, so that you can use first the eggs which are put down first. There is no danger of any musty taste to the eggs if you keep them in a dry place and are careful to use dry oats. Dry sawdust will answer as well as oats. In fact, any fine, dry material. If the substance in which the eggs are packed contains moisture, and the box is kept in a warm place, you can depend upon having a lot of spoiled eggs.

Keeping Eggs in Salt.—As to keeping eggs in salt, there are very many who like the plan, and I have always found salt a good preserver, but at the same time a hardener of the yolk and albumen of the egg. Let any housewife who has kept eggs for several weeks in salt compare the interiors of them with fresh ones, or those kept the same length of time coated with grease, and she will see the difference, and by cooking one of each a decided difference will be noticed in the flavor. For this reason of hardening, I do not approve of the use of salt.

The effect of salt is somewhat similar to the process of dipping eggs in boiling water thirty seconds; the heat coagulates the surface of the albumen or white and protects the other parts. Salt does not act in this way exactly, but when the eggs are wanted for use, a difficulty will be found alike in both cases when attempting to beat them into a froth for cake making, frosting, etc.

Process of Drying Eggs.—There is a process of drying eggs which is done by beating them into a uniform consistency, and then spreading the mass on a polished iron plate and drying rapidly in currents of hot air. The dried substance is packed and sealed, and when required for use can be dissolved in cold water and beaten up like fresh eggs; but this process I do not deem practical for general use, but may answer well where long journeys are to be taken, for in this way they can be preserved for years and carried without risk.

The Russian Process of Egg Keeping.—The mode of keeping eggs in Russia is to pack them in crocks small end down, and pour melted tallow over them; for transportation this process may do, but is not necessary for home use. The French rub eggs with fresh butter until the pores are all filled, which answers about the same purpose as coating with lard.

Bottling Eggs.—It is claimed that eggs will keep all summer if broken and put into large mouth bottles, the bottles being at once corked and sealed. They should be kept in a cool place, necks downward.

Salt and Lime Process for Egg Keeping.—"Take eggs that you know to be good, and place them in a firkin—first sprinkle two inches depth of salt all over the bottom of it. Put in the eggs the small end downward, so that the yolk will float in the middle of the white, and not cling to the side of the egg and spoil it. Fill up the firkin with eggs and lay a board over them or a plate, to prevent them from floating when the brine is poured in. Then slake three pints of lime in six gallons of water, and add to it two and a half pints of coarse salt, stirring it up thoroughly. Let it stand overnight to settle, and pour the clear water carefully over the eggs.

"The eggs must be kept entirely under brine—for if allowed to float upward they will spoil. A brine thus prepared will keep eggs for a year at least, but care must be taken not to let one of them break in the brine and spoil it; if this occurs, turn it out and make a new brine for them."

Another Formula.—To four gallons of boiling water add half a peck of new lime, stirring it some little time. When cold, remove any hard lumps by a coarse sieve; add ten ounces of salt and three ounces of cream of tartar, and mix the whole thoroughly. The mixture is then to stand for a fortnight before using. The eggs are to be packed as closely as possible and to be closely covered up.

Gum Arabic for Eggs.—Apply with a brush a solution of gum arabic to the shells, or immerse the eggs therein; let them dry, and afterward pack them in dry charcoal dust. This prevents their being affected by any alterations of temperature.

Alum and Lime for Eggs.—Some preserve eggs by use of a compound of alum and lime in equal proportions, dissolved in hot water, in which the eggs are dropped, and allowed to remain for ten seconds. A cement is formed on the shell, producing an air tight surface.

To Test Eggs for Table.—It is quite easy to know a good from a bad egg by simply holding it between the eye and a light. Hold the egg so that the hand will cut off all direct rays of light except those passing through the translucent egg.

To Test Eggs for Hatching.—"After the hen has been sitting seven or eight days, it is easy by a careful examination of the eggs to see if they contain chickens. This is best seen at night. Take a lighted candle or other bright light to the fowl house, and a basket with a little straw to receive the eggs. Put the hand gently under the hen and take out an egg or two.

"Shade the eye from the candle with the left hand, making a ring by bringing the thumb and forefinger together. Hold each egg against this ring so as to allow the light to shine through the center of the egg. Those eggs that have chickens will appear perfectly dark, except a clear space at the larger end. Those that are clear, and look as if they were filled with melted wax through which the light can shine, are useless and should be thrown away.

"When the eggs are examined the good ones should be immediately replaced under the hen. Now the advantage of setting two hens on the same day is, that if many of the eggs are clear, the whole batch can be given to one hen and a fresh lot to the other."

Artificial Incubation.—Thousands of eggs are now hatched every month by means of artificial incubation. The heat required is a little above 100° . Eggs can be hatched at a temperature of 101° , and the heat may be raised to 106° , which is the limit. If below the first named the desired effect will not be produced, and if above the latter they will be spoiled by excessive heat.

The whole arrangement should be such as to imitate nature as nearly as possible. A cheap incubator is made by use of a rubber bag filled with warm water, the same resting upon the nest and kept at one temperature by means of a lamp. Once in twenty-four hours the eggs should cool for twenty minutes and be turned.

Hatching has been managed by the eggs being placed in boxes just deep enough for them to lie, and the elastic substance touching them all, and it has also been done by having a spring bottom to the boxes which would press the eggs up gently to the heat above, or by leaving the eggs in a rack, water passing above them in a metallic chamber and passing in open troughs at the lower side of the box. The secret of success lies in keeping the heat regular during the whole process of incubation.

An instance is mentioned where artificial incubation took place by the eggs of a hen lying for a few weeks in a pile of horse manure. It seems a hen had managed to make her nest in a cavity in the heap, and after laying eleven eggs the opening had been closed by the stableman piling on more of the cleanings of the stable. The warmth generated in the heap had incubated the eggs, and nine of the eleven hatched out.

Wooden Nest Eggs.—One who has used wooden nest eggs says they are far preferable to glass or china, in that they are lighter and there is no danger of their breaking the eggs that may be laid in the nest. There is no danger of sending bad eggs to market if all real eggs are gathered often; and no danger from chickens or hens learning to eat eggs, which they are apt to do if an egg gets broken by freezing or by collision with a china egg.

Material for Nest.—Straw is better than hay for a nest. It does not favor vermin as much; it does not, in the event of accident and adhesion, require so much trouble to remove. Whenever an egg breaks and makes the others sticky, all the whole ones should be removed, washed in warm water and thoroughly dried before the hen returns.

Eggs Containing Chickens.—If eggs are put in warm water, those that contain live chickens dance a merry jig on the surface, while the bad ones make no sign. No egg explodes that has not had the germ developed, and fruitful, fresh eggs are not injured by traveling.

Rack for Keeping Eggs.—Nail together four boards eighteen inches to two feet long and about a foot wide, into a square, open frame; then make four shelves to go into the frame half an inch thick and same width as sides. Before putting in the shelves bore them full of inch and one-fourth holes, as near together as it will do to place eggs, so that the shells will not touch. The shelves should be equal distances apart and may be grooved in or made to rest upon cleats. No back or front is to be put on. Place the eggs smallest end down, and they will keep any reasonable length of time.

The rack should be kept in a cool, dry place. It may be hung by wires from the corners in open space, or against the wall, as one may choose. The size may be varied, of course, to meet the demands of the constructor.

CONSTRUCTION OF CHEESE FACTORIES.

Location for a Cheese Factory.—In locating a site for the construction of a cheese factory, two essential points should be kept in view: A dry, airy spot, with abundance of pure spring water. Avoid timbered land, deep shaded groves, ravines, high steep banks, if possible. Rolling ground is best, and a few scattering trees are not objectionable. After the water supply has been found, then get the best site possible near it; but it is better to carry the water by pipe a considerable distance than to locate the building in an unsuitable spot. Another feature of importance is in locating the factory as centrally as possible in the farming community that will supply the establishment with milk, and so that the milk wagons can easily reach the building by the public highways.

Size of Cheese Factory.—The size of factory buildings depends of course upon the amount of milk to be handled, and if the manufacture of butter is added, more room is necessary than for the same amount of milk where cheese alone is manufactured.

A cheese factory to accommodate the milk from eight hundred cows requires four No. 16 vats, from forty to fifty presses, and other fixtures in proportion; a manufacturing room thirty by forty feet is necessary for a business of this magnitude. A curing room thirty by seventy feet and two stories high will afford ample room for curing the cheese, unless several months' make is kept on hand; these two rooms will accommodate about fifteen hundred cheeses, or a little over one month's make in the height of the season from eight hundred cows.

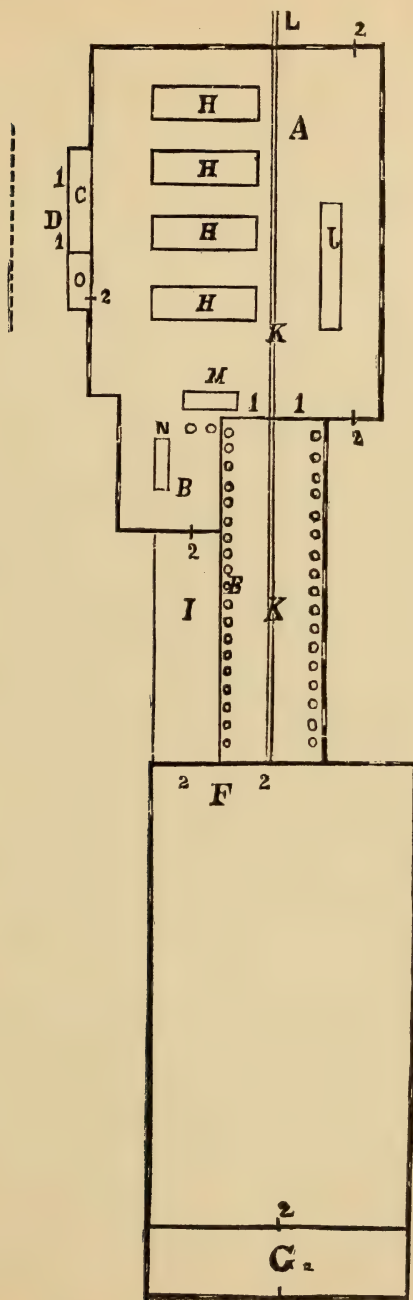
Plan of a Cheese Factory.—As to the mechanical arrangement of a cheese factory, I have obtained the following plan from one of the best builders and manufacturers of factory cheese in the United States. The drawing represents the ground plan:

"A is the manufacturing room, thirty by forty feet ; B is the boiler room, twelve by fifteen feet ; C is the room for receiving the milk, four feet by ten, the floor of which should be the same height as the top of the vats, or a trifle higher ; D is an open shed with lean-to roof extending over it, and the receiving room from the main building ; this should have a plank or good gravel floor for the wagons to stand on while unloading ; this floor should be one foot six inches below the scales where the weighing can stands ; E is the press room, fifteen by fifty feet ; the buildings so far need be but one story in height, but should be lathed and plastered inside or well ceiled with good lumber and provided with steam pipes from the boiler for heating in cool weather ; the windows will give abundant opportunity for ventilation ; F is the curing house, two stories high, thirty by seventy feet, with boxing room G cut off the end, and ten by thirty feet.

"H H H H are the vats ; I is a lean-to open shed for wood or coal, ten by thirty-five feet ; J is the drainer, sixteen feet long and mounted on strong castor wheels ; K is a gutter in the floor extending from the end of the press room through the manufacturing room to the whey conductor ; L leading off to the whey tank, which is not shown. This gutter should be six inches wide, with a shoulder on each side one inch wide, just even with the bottom of the floor, to receive a board of the same thickness as the floor, as a cover to the gutter, making it all smooth work ; this cover to the gutter must be in sections from two to three feet long, to allow their ready removal for cleansing the gutter.

"The floor must slope toward the gutter from each way, from the east (supposing the factory to be standing north and south) four inches and from the west six inches, to allow all slops which may chance to reach the floor to pass quickly and readily to it, and the gutter should be two inches deep at the south end and eight inches deep at the north end, to allow everything to pass readily off ; by a simple arrangement this gutter may be used to convey the whey to the tank, as well as the surplus water and slops to a drain outside ; M is a large sink for washing hoops, etc. ; and N two tanks, one for hot and one for cold water, and may be placed overhead out of the way, and should, at all events, be high enough to draw water from either at pleasure into the sink, a steam pipe from the boiler furnishing the heat for the hot water tank ; O is a room four feet by eight, for the salt barrels, rennet jars and scales for weighing salt.

"I I I I are sliding doors, two of them opening from the manufacturing to the press room, and the other two from the receiving room to the wagon stand ; these should be hung on rollers at the top ; 2 2 2, etc., are doors, and the open spaces are windows ; many factories have blinds to their windows, but we regard it as the better plan and less expensive to have curtains of common cotton cloth and mounted on rollers ; the cloth may be colored with annatto, which will give the light a soft mellow tint when the curtains are down, which need be only when the direct rays of the sun would strike directly into the room,



Cheese Factory Walls.—"This building should be finished throughout with double plastering, or else a space between the outside and inside filled with sawdust, which will render it very easy to control the temperature to a very great extent. The lower room should be provided with steam pipes for warming, which will be found to be the best arrangement, as well as the cheapest in the long run."

Cheese Factory Presses.—"The presses arranged on each side of the press room (see small circles in the drawing) must be so constructed as to not allow any of the whey, as it runs from the cheese during the pressing or while putting the curd in the hoops, or when the bandaging is being performed, to fall upon the floor. This we regard as very essential, from the fact that if the whey from the presses falls on the floor, although the utmost care and pains are taken to scrub and scald every day, the floor will absorb so much of the whey that in a short time a sour smell arises, which is at once disagreeable, loathsome and positively injurious to the milk and cheese.

"There are various devices for keeping the whey from the floor as it flows from the cheese, but none more effectual than to hang a pail on each pressing board, so as to catch every drop of whey as it flows from the cheese; no matter what position the press board is in, the pail is there ever ready for service.

"The press boards are frequently made with a groove cut in the upper surface to conduct the whey to one point. When the whey flows rapidly from the cheese, this groove overflows and the whey runs anywhere but in the right place. It is better to have a strip nailed on the edge of the press board all around, to project three-fourths of an inch above the surface of the board; this holds all the whey, and with a hole bored where needed, the whey is readily conducted to the desired point.

"Another device is to have a double press board, the bottom one fixed and a groove cut in it, so as to convey the whey into a fixed trough running along the back side of the presses, the hole for the escape of the whey from the upper board being so arranged as to be always over the groove in the bottom board, whether it is in place or drawn out for putting the curd in the hoops or for bandaging the cheese."

To Hoist Milk Cans.—"The best apparatus for hoisting the milk cans in a factory for receiving the milk is a common warehouse wheel. This may be used in connection with a crane, or if sufficient elevation can be had to allow the cans to swing, it may be used the same as it generally is in warehouses.

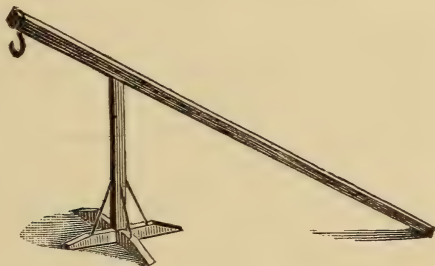
"A friction wheel, worked by the engine, might very readily be arranged to do the hoisting, and this would save a good deal of heavy muscular exertion. But with a good wheel arranged, one man can perform all the labor of receiving the milk just as well as to occupy three or four, as is the case in some factories."

Cheese Factory Windows.—"Plenty of light is absolutely essential for the successful prosecution of the work, and is also an essential element of

pleasantness. The windows should all be so constructed that they may be readily looked out of without getting on a bench, standing on tip-toe or getting on the knees. A cheerful, pleasant appearing dairy room, with pleasant surroundings, removes half the irksomeness of the labor, is inconceivably better on the score of health among the operatives, and, although it may not be so readily recognized, really adds very materially to the good looks and appearance, if not to the quality of the product."

RURAL MISCELLANY.

Portable Farm Crane.—A crane made after the fashion of the illustration may be of any size the farmer desires. The standard may rest upon cross pieces halved together, or upon a square piece of two inch plank, braced with iron or wood. The top of the post should contain a pin for the lever to work



PORTABLE FARM CRANE.

upon as a pivot. An iron hook is fastened to large end of the pole. The lever may taper somewhat from pivot to hook end, also from pivot the long way. Any one may make it who possesses ordinary mechanical genius, and at a trifling expenditure.

Broom Corn Frames.—A professional tells how he makes his racks or frames for curing broom corn, and his method is both simple and practical :

"I usually cure my brush on my barn floors, thus : I lay down two six inch boards about eighteen inches apart, and upon these I nail laths six inches apart the whole length. After making one for a pattern I continue to make a sufficient number like it, and place this ladder work upon end, forming stalls about three feet nine inches wide, the laths making the permanent supports.

"As the brush is scraped, about two-thirds of an armful is placed upon the laths, slipped in across the stall, commencing at the bottom end ; then two more laths are put in above, and so on to the top. About 2,000 cubic feet of space

will dry a ton of brush in fifteen days in good drying weather. If the brush is wet or damp it should be spread thinner.

"When a majority of the brush is well out of the leaf, and the seed in the milk approaching the dough state, the crop, if cut all at one time, will produce more pounds of brush and of better color than at any other stage of growth. In all the handlings keep the brush as even as possible and heads all one way."

To Make a Bag Frame.—In the upper wall of the granary put a couple of staples or large nails four or six feet apart, and to these attach fine, strong wires long enough to come down within handy reach. To the lower ends of the wires suspend a rake handle or other small rod, over which the bags may be hung with an assurance that not a mouse can reach them.

Large Bell on the Farm.—When the gong described on page 500 is not procured, a large bell should be kept, and every farmer's wife should insist on her husband getting one. Not only in cases of fire, but in case of any accident that may happen to the house, or to the family at night, or in the day time, through sickness, a broken limb, a severe cut, a gunshot wound, or in the event of the many severe accidents that might occur, the bell would at once summon aid and effect the saving of property or life.

To Clean Seed Oats.—An old grain grower says: "Place your oats in a heap on the middle of the threshing floor at the end that the wind blows to. Get you a milking stool and a small scoop—your wife's flour scoop will do—and throw the oats with a light turn of the wrist to the other end of the floor against a gentle wind.

"A little practice will soon enable you to throw it in a half circle and at the same distance. Sweep off now and then the utmost circle for seed, the light oats for feed and the weed seed to burn. You will now have seed oats worthy to sow without buying at \$5 per bushel. I saw oats grown in Sweden until I was forty, but I never saw a heavy crop where the seed was not cleaned as above."

Forcing Radishes.—Radishes may be grown in a few days, it is claimed, by the following method: Let some good radish seed soak in water for twenty-four hours, then put them in a bag and expose it to the sun. In the course of the day germination will commence. The seed must then be sown in a well manured hot bed, and watered from time to time with lukewarm water. By this treatment the radishes will, in a very short time, acquire a sufficient bulk and be good to eat.

Seeding Bare Spots.—Spots where knolls have been leveled in summer may be seeded the following March successfully. The advantage in doing the work then, lies in exposing the soil which is laid bare to the action of the atmosphere, frost and sun for some months before seeding is done, which is necessary to obtain a growth of grass. If the land is stiff clay, give a coating of loamy soil before applying the seed. By a little care the alluvial portion just beneath the sod of the mound may be saved for this purpose.

Lines for Sawing Boards.—It is always advisable to mark your wood with a chalk or pencil line before beginning to saw. If timber is not sawn straight or square, much extra work is afterward required to plane it or finish it up true. It is not a bad plan for a beginner, who is sawing a long plank, to mark both sides of the wood, and to turn it over when he is departing from the line.

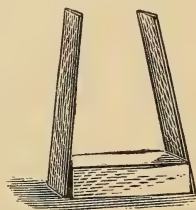
Foundation for a Dam.—In case the bottom of the river is quicksand or soft soil, it is difficult to keep a dam foundation from being washed out. Even if laid of stone a flood will displace them. Men of experience say that nothing will stand so well as bundles of brush. Hemlock and willow are best, but any kind will do. The building is simple, and the labor can be performed by any common laborers.

The commencement in a strong current is the most difficult, which can be effected by placing the body of a tree across the stream for the brush or trees to rest upon, with the tops up stream in all cases. When a good foundation is laid, coat it with stone, and so on alternately, until the required height is produced, reserving the largest stones and the lightest brush for the last coating. Make tight with gravel or clay and stick bank willows every two feet throughout the whole course, and you will soon have a dam that will want but little repairing, and which will be durable and permanent and no floods can move it.

Trees put in top ends up stream also work well. Lay as closely as possible; pin on a cross pole six inches through; then put on another layer of trees, laid on as before, breaking the spaces as well as may be, letting the ends rest on the pole, on which they are pinned as before; then another pole as the first, and so on up to the top of the dam. Each layer of trees should be laid with butts two or three feet further up stream, to form a proper slope for the descent of the water, so as to prevent its boiling back and undermining the work.

How to Make a Bag Holder.—A bag holder is a very convenient thing to have in the barn, corn crib or granary, and may be made in a short time by any one. Take a piece of plank about twenty inches long and a foot wide, bevel off the ends a little and nail strips of thin boards six or eight inches wide to it for uprights. The plank base should be beveling enough to make the uprights about fifteen inches apart at the upper ends.

The bag is placed between these, and the upper end folded over the ends of the uprights two or three inches. It will be held firm and in a convenient position for filling. The uprights should be just long enough so that the bag will rest upon the plank when being filled.



CONVENIENT BAG HOLDER.

Two hooks fastened upon the wall of a granary or crib eight or ten inches apart and the proper height from the floor will be found handy for holding bags while filling them from the half bushel.

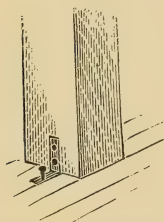
Foothold for Fanning Mills.—Horse power machinery has not yet put the fanning mill entirely into disuse, and probably never will; for one is always found handy at the farm barn. When used upon an uneven floor it is not likely to stand solid or keep in one position. The rapid turning of the crank makes the mill slide around in a provoking manner.

The mill can easily be made stationary by use of cleats at front and back



SIMPLE FOOTHOLD FOR A FANNING MILL.

ends. To make the cleats, take two strips of board four or five inches wide—half inch thick will do—and one foot longer than the mill is wide. Saw half in two six inches from each end, and remove one-half of the wood between the cuts. One or two nails partly driven in will hold the cleats to the floor and the mill to its place.



IRON FOOTHOLD FOR FANNING MILL.

Another way is to turn the mill upon one side and drive a heavy wrought nail into the center of each leg; file them off near the head, allowing them to protrude one-fourth or three-eighths of an inch, then file the ends sharp so that they will easily penetrate the barn floor.

It is best to cut off the points of the nails before driving them in, so as to leave a blunt end in the wood; they are less liable to be driven up by pressure.

Another way still is to screw on to each post a malleable corner iron, that can be bought at any hardware store for a few cents. When the mill is set in place a screw may be driven through the projecting iron into the floor, and removed again at pleasure.

How to Pull a Sheep Pelt.—Should the flock master be so situated that he finds no profitable market for his sheep pelts, he can arrange to “pull” them himself with very little trouble and no great amount of labor. The following process given by a wool grower is a very good one:

“The pelts should be soaked until thoroughly softened—say from twenty-four to forty hours—and, if possible, in running water. A latticed or perforated box sunk into a stream will answer for a vat. From this they should be hung in a close, warm room—a tight cellar, for instance. If no such room is available, a tight box can be used.

“The breech end of the pelt should be tacked to a stick or lath, and the pelts hung as closely as can be, without touching. They will pretty soon begin to ferment, and as soon as they are tender enough to shed the wool easily—which

can be ascertained by trying a lock with the thumb and finger—they must be pulled."

To Make a Fleece Horse.—A pulling "horse" can be extemporized thus: "Take a smooth log, five or six feet long and about a foot in diameter; split through the center, and in one end put two legs two feet long, leaving the round side uppermost, one end resting on the ground. Place the pelt on this horse, with the wool side up, and if, in proper order, the wool can be scraped from it in less time than it takes to read these directions. For scraping the wool off, a large wooden knife—a 'skiver'—is best, as it answers every purpose and does not endanger the skin.

"The wool should be dried as soon as can be, to avoid molding, and is then ready to be sacked for market. Care should be taken that the skin does not rot before the process of pulling, or the cuticle will adhere to the roots of the wool, making it unsightly, and consequently unsalable."

Working Highways.—One of the worst features in the management of roads is working them but once a year, and this in part accounts for the water pools on the wayside; the ditches not being kept open after they are constructed. Another bad feature is the plan of filling rut holes with cobble-heads, for as soon as the earth around the stones settles or washes away, an annoying prominence is left to jog every one who rides over it, and it also obstructs the working of the scraper. Stone or gravel should never be put upon the highway, unless enough is used to macadamize for a certain extent the whole width of the track.

Mistakes in Transplanting.—One of the most fatal mistakes made by novices in transplanting, is the idea that it must be done when the earth is wet. If you can so time your work that you can transplant just before a shower, you will have hit the mark exactly, but if not, wait until the land is again in good working order. Never set out plants in the mud. Just at night or in cloudy weather is the best time. If the plants are small, keep the roots in water until they are replanted.

Mechanical Improvements of Soil.—The cultivator can improve his soil mechanically by the use of a different kind of earth upon the one to be improved. Fifty loads of stiff clay to the acre, applied in the fall, to a light sand, to be plowed in the spring, and one hundred loads of sand applied to heavy clay land, and spread any time before plowing, will be found to have very beneficial effects, and this mixing of soils, where necessary materials are not too far apart (which very frequently is not the case), affords one of the cheap means of improving the soil, especially as the operation can be carried on at such times when the hands and teams might otherwise be idle.

Root Trimming of Trees.—Nineteen-twentieths of all the shade trees, especially maples, planted out in our streets, have the roots chopped off in taking up, and to balance this, the tops are also cut entirely away. A tree, three

or even four inches in diameter, is left with a root of eighteen inches, or even less, and without a single branch at the top.

It is wonderful that trees so treated live, and when they do so, it shows the strength of the vital principle within. A tree should have good, long roots, and a few branches at least, and then, if carefully planted, the chances of success exceed those of failure, and stakes are not necessary to support the trees, unless cattle or other animals rub against them.

Strength of Oak Columns.—A standard adopted in England is, that an oak column of a length not greater than fifteen times its diameter should sustain a load of five hundred pounds to the square inch of its sectional surface. These facts may be of benefit to farmers.

How to Make a Half Mile Track.—The *Spirit of the Times* directs that for inside fence lay off two parallel straight lines each six hundred feet long and four hundred fifty-one and four-nineteenths feet apart, taking care that a cross line from the end of one to the end of the other will form an exact right angle, and then run a perfect curve at each end upon a radius of two hundred and twenty-six and two-tenth feet. The curves can be conveniently made by placing a firm peg in the center of the cross line referred to, to which a wire can be attached; then measure off two hundred and twenty-six and two-tenths feet of the wire, and at that distance put down pegs corresponding with the panels of the fence desired.

A track thus constructed will measure an exact half mile three feet from the inside fence. Of course the outside fence will be placed according to the width of track desired. For public purposes, the homestretch should not be less than sixty feet wide, and the remainder of the track from forty to fifty.

How to Fumigate a Barn.—McClururs directs the procuring of a kettle of coals, and upon the same put a piece of brimstone stick as large as a man's thumb. This will fumigate a large cattle shed or barn in about twenty minutes.

The result from experiments with it are shown, which leads to the conviction that the diseases, such as cholera, pleuro-pneumonia, mange, ring worm, and lice, have disappeared before the gas, and that greasy heels in horses have been cured by it, while serious cases of glanders have also been amended by the judicious use of the once considered poisonous gas.

Outdoor Brick Ovens.—"After the foundation has been prepared, let two courses of hard bricks be laid for the bottom of the oven. Then build the mouth and part of the sides, until it is desirable to begin to draw the sides inward, when sand or mellow earth may be placed on the foundation, and the surface smoothed off and pressed down to the desired form of the oven. Now let the brick work be built over this form of sand. Let two courses of hard bricks be built over the form with the best of mortar. After the last bricks have been laid the sand may be removed.

"The bricks should be soaked for several hours previous to being laid, so that they will not absorb the moisture of the mortar until it has set. Such an oven will cost but a few dollars. Many people can collect a sufficient number of loose bricks and pieces around their dwellings to build a brick oven. Besides this, any intelligent man, though half a mechanic, can build such an oven about as well as a mason."

To Make Houses Fire-proof.—A writer in *Cassell's Magazine* inquires why should we not make rural houses unflammable and our furniture fire-proof? Timber may be prevented from firing by simply impregnating it with a concentrated solution of rock salt. The fact has, he says, been announced by a German chemist, who was commissioned by a fire insurance company to solve the question, that salt renders the wood proof against the ravages of fire and also against dry rot.

How to Make a Goose Nest.—Three inches of horse manure should be placed on the ground, and plenty of straw formed in a nest upon this. Then place a large box over this with one side open, leaving only room for the goose to go out and in.

How to Drive a Nail.—It is advisable always to bore a hole in your work before driving in a nail, and this hole should be one size smaller than the nail. In soft woods the nail will be easily driven into the work without a hole being made, but the wood very frequently will be split. The nail should be hit exactly in the center of the head to make good work. A few short taps first, and then heavier blows.

Hauling Out Manure.—I do not approve of hauling manure upon grass land at any season of the year but spring; for if drawn out in the summer, it is liable to dry up and a good deal of its fertilizing element be carried away upon the atmosphere; if drawn out in fall or winter, the heavy rains will, while the earth is frozen, wash a portion away to the streams; but if drawn out and spread upon the surface in the spring, just as the grass begins to grow, it is soon covered, and the warm rains wash it down around the roots of the grass, where the full benefit is received.

How to Destroy Weeds.—Weeds which are cut after they have gone to seed should be burned before they are sufficiently dried to shell. Where they are dead ripe and dry, it is better to mow them down and burn without piling; a little dry straw, poor hay, shavings or litter of any kind sprinkled over dry weeds after mowing, or if they are thick before, and burning the mass together, will destroy a multitude of seeds. Weeds that have seeded, whether dry or green, should never be put into the compost heap, for there will be no assurance of the seeds losing their vitality.

When it is possible to do so, weeds should be cut at some period before out of bloom, for perfect security against propagation is given and the mass may be made of value by decomposing.

Planting Seeds Early.—Spring frosts will not injure beets, carrots, cabbages, celery, cauliflowers, lettuce, leek, parsnips, parsley, peas, onions, radishes, salsify, spinach or turnips. These seeds or plants may be put into the ground as soon as it is in order with safety. In making selections, it is best for beginners to stick to old and established sorts and to cultivate but a few varieties of each kind. Experience will soon decide for you when it is safe to venture after new kinds, and also those best suited to your soil and conditions.

Packing Strawberry Plants to Ship.—Take up good, sound and young well established runners; remove all decayed leaves, tie them in bunches of twenty-five or fifty, with their crowns evenly arranged; wrap in moist swamp moss; pack tight in an open box with the crowns upward, and nail slats across the top to keep them in and yet allow free access of air. Thus shipped, they will go long distances without injury. The best season for shipping in spring is the last of April, and in the fall the middle of September.

Use of Tan Bark.—I consider tan bark of very little value as a manure and on some soils an absolute injury unless well decayed, and years are required for that process. On a heavy clay, tan bark may be of some benefit as a loosener of the soil, to lighten it up so that vegetation can draw the primitive elements. As a mulch for strawberries it answers a tolerable purpose, but as a mulch generally I should prefer many other materials; as an absorbent for stable use it is not valuable, nor is sawdust, when so many better materials are as easily obtained. I would not haul tan bark twenty rods for any purpose unless for house banking or some similar use, and would not allow it to be put upon good, loamy soil if the work should be offered gratuitously.

Saving Onion Sets.—The cheapest and best way to get a good supply of onion sets is to save them from black seed when thinning out beds. Preserve those ranging from the size of a bean up to the dimensions of a chestnut. Throw them upon the ground or a platform of boards and let them lie there, rain or shine, until the tops are entirely dead and dried up. Spread them on the garret floor or any convenient place in the barn or wood house until fall, when they should be put where frost cannot reach them.

Any amount of sets may be raised by sowing black seed broadcast in a rich nook of the garden, and pulling and drying when at the right age, as above directed. They may be sown for this purpose at almost any time during the summer. If farmers would pay more attention to saving garden seed they might secure earlier vegetables. A great deal depends upon having seeds ready when wanted, and having them all grow when put in the ground.

Summering Over Hay.—It should be the aim of every farmer to summer over at least half a winter supply of old hay, and if possible a full supply to take the stock commonly kept through the winter. Then in case of a short crop no sacrifices have to be made. The husbandman who in time of short crops is caught with an insufficient amount of feed for his stock as the chills of

winter come on, is made a victim of circumstances unpleasant indeed. At such a time stock will not bring a fair price; the best of his herd and flocks have to go, if any; fodder and grain advance to figures which make absolute loss in feeding, and discouragement follows.

To Decompose Bones.—Dr. Voelcker says: "Placed in a heap with ashes or sand, occasionally moistened with liquid manure or water, bone enters into putrefaction and becomes a more soluble and energetic manure than ordinary bone dust.

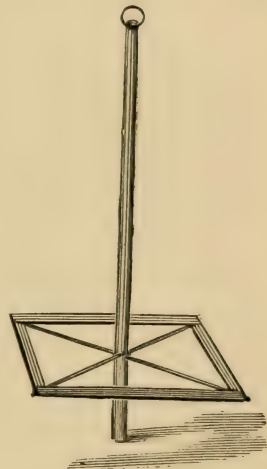
Best Fertilizers.—In the discussion as to proper manures, I fear that the condition of the soil itself is too often neglected. Many are led to believe that the great value of manures depends upon their direct absorption into the structure and seeds of plants; and while this is true to a certain extent, the other fact should be constantly borne in mind, namely, that manures act as solvents of ingredients already existing in the soils.

Too much care cannot therefore be taken in the proper preparation of the soil. Harrows, clod crushers and effective underdraining are often better fertilizers than all the manures we can apply. Without such preparation of soil, manures are of comparatively little benefit; with it the poorest soil may be made to yield a large return.

Contrivance for Weighing Hay.—Make an upright standard, five or six feet in length, of four by four scantling; a round pole will do as well. Near the bottom of this standard, two two-inch holes are bored crossing each other, one its width above the other. Round, straight poles are slipped through these holes, projecting some three or four feet each side of the standard.

On the ends of these poles are laid and fastened light, narrow strips of boards or poles forming a square, the sides of which are equally distant from the standard. A clevis is attached to the top end of the standard in which to hook the steel-yard. The usual lever arrangement is used to raise the hay, which is simply pitched on the platform. When not in use the cross poles can be slipped out and the whole stored in a small place.

How to Dig Potatoes.—Digging potatoes by hand is hard work, taken in its easiest form. With the common tools used much more labor is expended often than is required. In sandy soil the potato hook is much better than the hoe, and more work may be done by the use of a common barn shovel than either in any soil. By driving the shovel down beside and under the hill, a portion may be



PLATFORM FOR WEIGHING HAY.

lifted out, and by a quick jerk the whole scattered over the surface, the potatoes separated from the soil. Two applications to a hill will generally do the work complete.

Scythe for Cutting Bushes.—For cutting briars and thistles, half a scythe hung upon a snath makes a good tool, and for bushes nothing is better than an ax. Cut the bushes low, better beneath the surface than above it, for if stubs are left, animals are liable to receive injury by stepping upon them.

Utilizing Rotten Apples.—When picking over apples in the cellar, have a barrel prepared with a few holes in the bottom, standing upon an inclined platform, and into this throw the rotten apples; mash them up, add a little water and a pressure. The cider extracted will make vinegar.

Seeds from Strong Plants.—It is mistaken policy to save seeds from the last and most feeble growth of plants. A portion of each valuable variety in the garden should be selected from those in full strength and vigor, and allowed to ripen undisturbed. Seeds from such are worth double those gathered from the former; they are certain, while the others are not, and experience has proven that the first matured seeds will develop their kind two weeks in advance of those gathered from the latest growth.

A hill or single vine of squashes, cucumbers, etc., should be set apart to ripen their productions, for so much nutriment is drawn from the vine to make up full grown seed fruit, that the supply of cucumbers for pickling, or of summer squashes for table use, will be materially cut short if the vines throughout the garden are burdened with this work.

To Manage Locust Seed.—Locust seed may be kept dry for a year or two without destroying its vitality, but it must in all cases be thoroughly scalded before sowing, or it will lie a whole year in the ground without vegetating. For a quart of seed, pour on four quarts of hot water and let it stand twelve or twenty-four hours, when most, if not all, of the seeds will be swollen to several times their former size.

Stir the seeds while in the water so as to agitate them briskly, and while in motion pour off the water and swollen seeds, while the others, being heavier, will remain at the bottom of the vessel; then scald and let soak as before, and they will generally all swell. The seeds can then be sown where designed to remain or in a nursery bed, and the trees transplanted when one year old.

To Test Small Seeds.—To test small seeds, count out a given number and sow them regularly in a box of fine earth, covering them about one-half inch deep by sprinkling on fine dirt. Keep them moist with warm, soft water, and count the number of plants that grow. If five out of every fifty fail, it may be put down as tolerably certain that one-tenth of the whole seed is poor, and an extra amount should be used accordingly.

Testing Seed Corn.—On the upper side of the kernel, or the side next to the tip of the ear, is a cove or indentation. At the bottom of this cove lies

the germ, and very near the surface, being covered with little else than the thin hull of the kernel.

If the seed possesses vitality, this germ will be plainly visible in the form of a narrow, rounded cord or stripe, running from the head of the cove toward the point of the kernel, and usually of a darker color than the general surface of the cove. It is not necessary that the germ should form a ridge through the bottom of the cove. Its appearance is more as if imbedded in the kernel and slightly covered with a semi-transparent surface. If the enamel of the cove is bright and smooth and this line visible, we may be sure the seed will germinate. If the surface of the cove is dull and wrinkled, and no line visible, it will be useless to test it in earth.

How to Plant Nuts.—Chestnuts, walnuts and similar kinds of tree seeds should never be suffered to become perfectly dry before planting. If not convenient to plant them soon after their time of ripening, they should be put in a box of sand and kept moist (not wet), and be allowed to freeze during winter, then planted early in the spring, covering them about two inches in depth.

They may be planted where the trees are to remain, taking care to keep the plants clear of weeds and grass while young; or, they can be transplanted when two or three years old, taking them up carefully without injuring the roots, and not exposing them to drying while out of the ground.

Bottling Seeds.—Garden seeds, after being well dried, may be put in bottles and left uncorked and rendered perfectly secure against the ravages of mice. Another advantage in the use of bottles is, the seeds may be readily seen at any time and labels dispensed with.

Stripping Tobacco.—An eastern tobacco grower advises those producing that crop not to be in a hurry to get tobacco down and stripped, for more sap will be found in the stem than is supposed to exist there if stripped early, and the tobacco will injure after being bulked. He says, let it hang on the poles till thoroughly cured, if it takes till January or April; then strip, assort, and pack carefully and honestly.

If you have occasion to pack it in boxes, use boxes two and one-half feet wide inside, by three and one-half in length. He has often seen tobacco that the tips of the leaves would have to fold over in a three and a half foot case when packed; but speculators and buyers object to a longer case, and insist, almost invariably, upon the above sized cases.

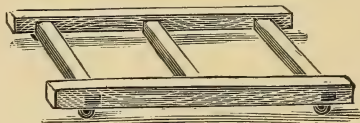
Sprouting Seed Corn.—If the crop can be put in seasonably, I do not believe that soaking is advisable, for there is no telling what the weather may be three days ahead; and if unfavorable, the grain put to soak is made to lie in water until the sprouts become so long that they will be broken off while handling, and besides, soaked corn cannot be used in a planting machine, either horse or hand. Another disadvantage from soaking corn may come from dry weather following the deposit of the seed.

I have known farmers to lose their entire labor from such events, the sprouted grain drying up in the hill and becoming worthless. Grain which germinates in the natural way—*i. e.*, from the moisture in the earth—is not affected by a hot sun as that which has been soaked full of water and had the same drawn out by the earth.

Using the Hand Corn Planter.—If the weather at planting time is dry, I always use a hand planter, for when the seed is covered with loose dirt from the hoe, the sun and wind very soon dries up the soil and prevents germination; or if sprouted, dries up the grain and destroys it, as before stated.

One year, when planting a five acre field in dry weather, I abandoned the hoe when about half way through and took the hand planter for the purpose of saving time, and finished the field; the result was that the last planted came up several days earlier than the former, and kept ahead all the season, and so distinctly that the dividing row could be seen at fifty rods distance, and the yield of the two and a half acres put in with the hoe was at least one hundred bushels less than the same amount of land put in with the planter, and the soil was the same.

Now the whole of this difference was owing to the circumstance mentioned above. While that which was deposited in damp, close soil, sprouted immediately, that with a light coating of dry earth over it came on very slowly, and made a sickly growth during the whole season.



CHEAP AND HANDY BARN TRUCK.

Barn Truck.—A very handy truck for moving barrels of grain, vegetables etc., may be made by framing together two pieces of three by three scantling and three strips of planks, so as to form a platform three feet long and two feet wide, and resting the same upon four piano casters. The illustration shows the truck without board platform; one may be put in if so desired.

How to Save Timothy Seed.—Timothy designed for seed should be allowed to stand until fully ripe before gathering, and then cut in the morning or evening while a little moist with dew, to prevent loss by shelling. In places where the cradle cannot be handily used, cut with the sickle; never use the scythe if it is possible to get along without it.

The grass should be bound in as large bundles as can be easily handled, and bound tight, for the purpose of saving all the seed. Large sheaves give protection to a greater number of heads than small ones, and tight bands hold the seed that falls into the center.

Set the bundles up two by two, and when all moisture is dried out and the

heads "strip" easily, draw to the barn in a tight boxed wagon, and thrash immediately. Run the seed slowly through the fanning mill, and then through a fine wire sieve, holding it high in a light breeze so that all of the chaffy matter will be blown away, leaving the seed entirely pure.

Seed Saver for the Stable.—Many bushels of grass seed may be saved during the winter season by arranging the mangers after the following plan: Instead of having a board in the bottom of your manger, have the bottom made of slats an inch and a half or two inches wide, with an opening between of not over one inch; if the opening is larger, too much hay will get through with the seed.

Make an inclined plane from the bottom of the slats, so that the seed will slide into your feed room or barn floor, as it may be. The space in front from the slats to the inclined plane of ten or fifteen inches should be left open; if there is but a narrow space left for the grass seed to slide out, it will soon be filled up with the hay that the horses will work through the slats. The seed that you will save in one winter by this arrangement will pay twenty times over for putting it in.

To Revive Wilted Cuttings.—Mix three or four drops of spirits of camphor with an ounce of water, and keep the stems in this fluid for half a day or more, in a dark place, till they have entirely recovered.

To Clean Seed Wheat.—Take some thin lumber, say siding, and tack a board to the bottom of the fanning mill sieve so as to cover about half—the outer half. Have your sieves not very slanting; turn moderately. When the wheat leaves the hopper on the sieve the wind carries the oats farther than the good wheat, and they go on to the board and over into the tailings, while the wheat is left clean.

Storing Beans.—Beans after thrashing should not be stored in large quantities, as they are liable to sweat and mold; it is well to spread them in a dry room for a time, and then put them in sacks to prevent the generation of moisture. If necessary to store in boxes or barrels, they should frequently be changed from one to another until perfectly dry; this will expose them to the air and bring the bottom ones at the top.

To Plow Under Corn Stalks.—The first action should be breaking down the stalks, which may be done by hauling across the field a piece of timber sidewise. If the stalks do not lie down straight enough, the harrow may be used.

Scales on the Farm.—Let every man provide his family with accurate scales and measures; then educate every member of the family that is old enough to do business how to use them.

Weigh every article to be sold, and make a note of the weight; don't trust to memory; memory is sometimes treacherous. Then, when the article is sold, make a note of the purchaser's weight; compare the two. Again, when an

article is bought make a note of the seller's weight, then weigh the same article at home; compare weight again. By pursuing such a course any person may soon become satisfied whether there is fraud practiced or not, and be governed accordingly.

For a few dollars platform scales with scoop balance combined can be purchased, and they will give the weight of articles from half an ounce to two or three hundred pounds.

Growing Trees from Roots.—When you wish to procure young fruit trees of a particular kind—for transplanting—dig around the old tree some eight or ten feet off, and turn the end of the detached root up out of the ground, and it will send out shoots the first season, and in a few years bear fruit of the same kind as the parent tree, and it will make just as good a tree as you would purchase of a nurseryman, and the expense of purchase is saved.

Cutting and Killing Bushes.—I always had the best success in cutting bushes in midsummer, not at any special time in the moon, but at a time when the shrubs had expended their vital force or finished their growth for the season. But few shrubs cut down in August will sprout again. When cutting, do not leave a sharp edged snag in a single instance, for a valuable horse, ox or cow may be ruined by it, cut below the surface every bush too large to be mown down readily with a common hand scythe.

To Make a Cheap Pulley.—A very good pulley to be used with a strap may be made by sawing a block from the end of a round, dry iron wood pole. Bore a hole through the center, put in an axletree, and then true the surface by scribing a circle upon the block. Two square blocks, an eighth of an inch thicker than the pulley, and a couple of side pieces of proper length will form the box for the pulley to run in. When it is to be used for a door weight, fasten the blocks to the casings, put the pulley between them, and put on the cap. On barn doors the pulley may be weighted by the poll of an ax or an old flatiron.

How to Camp Out.—Mr. John Hutchins, the veteran and noted trapper of Maine, when interviewed once upon the subject of woodcraft, said:

“There is a good deal to be learned about camping out. When I go into the woods to trap for any length of time I generally build a home shanty of logs or bark. If I want to build one which will last three or four years, I make it of logs, notching or dovetailing the ends and laying them up in block house style, filling the cracks with moss, and making a roof of split cedar or bark.

“Sometimes I make a shanty by simply driving down two crotched sticks, placing a pole on them, and sticking down poles all around excepting the front, and covering them all over with spruce bark. When near the home shanty I sleep there, of course, but at other times I have no covering but a single blanket. I find a big log, and make my bed of boughs on that side of it least exposed to the wind.

"If the snow is deep, I select my camping place on the hill side, digging down to the ground to make a fire and sleeping myself on the snow below, so that the flame of the fire will shine directly upon me.

"When traveling by water, I draw the boat on to the bank at night, partly turn it up, and sleep under it, building a fire a few feet distant in front. I generally have slept very soundly in the woods."

Packing Green Corn for Market.—The following method of packing corn for market is recommended by several market gardeners who supply large canning establishments :

'The ears of corn are thrown indiscriminately in a barrel, the number of ears, however, being carefully kept, until it is filled within six or eight inches of the top, when the whole is finished off with a number of good large ears placed upright, the point of the ear downward. After these last ears are fitted in nicely, the butts are driven down with the flat side of a piece of board two feet long by eight inches wide. This method keeps the corn in its place in the barrel.

"When corn is intended for open market, it can be packed in truck baskets holding from four to six dozen ears, the whole finished off in the manner described above."

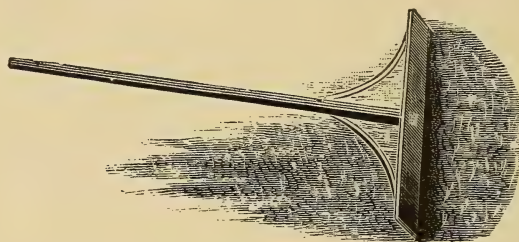
To Make a Stave Gauge.—A tank maker gives the following description of a very simple gauge for staves : Make a gauge of a thin piece of board (a shingle will do), by striking part of a circle on it of a size desired for the largest end of the tank, also another part of a circle of the size of the small end of the tank, struck from the same center. Draw radial lines across the segment thus marked out, say about one-eighth of an inch apart. Cut the shingle to the circular lines and nail a piece of lath to it, the straight edge of it to one of the outside radial lines, and the gauge is finished which will lay out correctly any stave to be wide or narrow.

Suppose a stave will work to a certain width, place the gauge upon that end and mark from the edge of the lath to any radial line which fits the width of the stave, marking by the line which reaches the outer circle of the gauge. Then slide the gauge to the other end of the stave, or the distance corresponding to the height of the tank, and mark again to the same radial line on the inner circle. Then line from these two end marks.

To Make a Fumigating Tube.—There are many remedies offered for lambs infested with ticks, and one of the most effective is a fumigating tube used with tobacco. A tube may be cheaply constructed of tin or wood that will answer every purpose. One end should be pointed. A hole the size of a straw is large enough for the smoke to escape through. Fill the large part nearly full of tobacco, light it, then blow the smoke into the wool with a hand bellows, keeping the point of the tube near the skin. Go over the whole fleece, blowing in smoke once in six or eight inches, closing up the wool as soon as the tube is removed, so that the smoke may be retained.

Pitchfork Handles.—Never try to make these if there is any opportunity to buy them, for the labor will not pay. In making or selecting a fork handle, have the heaviest part about one-third the distance from the tines to the end, as this is the point where the greatest strength is needed. Hoe handles should be just a trifle the largest a little above the center or at the point where the right hand comes. Second growth white ash is the best material for fork, rake and hoe handles.

The Push Rake.—The push rake will be found a very handy implement about the barn, door yard, etc., and especially at the stable. The illustration will suggest its proportions. The head should be of hard wood, about six inches



HOME MADE PUSH RAKE.

wide and twenty or more long. The handle may be made by dividing into three parts with a band two feet above the head, or with a straight handle and iron rod braces. The split handle is stiffest and best.

Renovating Barren Soil.—A piece of land once came into my possession that had been under the plow for twenty years and was considered worthless; weeds would not grow upon it. This was plowed up in the fall about seven inches deep, and being heavy clay the work required four horses; it lay in large lumps during the following winter, but through the action of the frost the most of them slaked down in the spring, when a good coat of long manure was put upon it and turned under.

During the summer I gave it one or two good workings with the cultivator, and in August threw it up into ridges with a single horse plow, and about the 20th of September gave a sprinkling of manure from a sheep shed and sowed one bushel and a peck of red wheat per acre. From the piece I harvested thirty-two bushels per acre of clean, plump wheat. The piece was then stocked down and has since produced heavy crops of grass.

How to Make a Granary.—A grain grower says that for building a rat proof granary select the toughest white oak lumber you can find. Have it one inch thick and six inches wide. Take it to the mill and match it. (Did you ever see a rat hole through the joints of matched lumber?) Have a good floor of hard oak lumber and board up on all sides with the same material. But before commencing this, tack a strip of tin about two inches wide to the floor

next to the studs, letting it extend inward. When the first board has been firmly set upon this and fastened, the inner edge of the tin must be turned up and nailed to it. No chance for rats there, as some ten years' trial has proven. The bins should be partitioned off, the ceiling lathed and plastered, etc.

Door Yard Shrubs.—One of the most noticeable defects in country and village door yards is a scarcity of good flowering shrubs and roses. If these occupied the place of the large trees now standing in small yards it would be a very great improvement. Shrubs are particularly suited for positions near to fences and walls, to relieve the stiffness of straight lines of wood and paint or to screen from view the back premises, etc. Dwarf growing evergreens are also appropriate for these purposes, and add much to the cheerfulness of the grounds in winter; but many evergreens impart too somber an aspect in summer.

Use for Old Mowing Machines.—A rural gentleman tells how an old mowing machine may be converted into a horse power for running small machinery. Take off one driving wheel, and near the place of the article to be run, fix upon firm timbers the mowing machine with its remaining driving wheel uppermost. Upon this driving wheel a lever about ten feet long is fastened with bolts; to this lever the horse is attached, and as he walks in a circle around the machine propels its gearing. The pole of the mowing machine, fastened by bolts to the same wheel that formerly gave the vibratory motion to the cutter bar, now extends horizontally along the ground, and on its end outside the circle of the horse's walk is placed a wheel upon which the rope belt runs, connecting with a similar pulley on the end of the machinery to be run.

How to Stack Corn Stalks.—The objection to storing corn stalks in round stacks is, that when the top of the stack is removed the fodder is exposed to the weather. To obviate this, build the stack narrow and long with square corners. Lay down rails in an extended straight line—as long as may be required by quantity of stalks—on blocks or stones that will elevate the rails twelve or sixteen inches above ground. It is well to lay down a few rails to keep the stalks from close contact with the ground. Then lay down two rows of bundles, butts out, and tops well lapped on to each other across the elevated rails. And thus lay course after course, and if the middle is likely to become flattened so as to incline the rains inward, lay a row of bundles lengthwise occasionally.

In topping out the stack have it left quite oval; then begin at one end with two bundles bound together near the tips, and straddled out so as to shed the rains off down the sides—and so proceed the entire length of the stack. In feeding begin at one end, taking down about six feet in a course at a time. By this method but little damage will accrue to the stalks from snow and rain.

Mowing Lawns.—The chief requisite in the after care of a lawn or grass plat is to mow it frequently, so as to prevent the grass from ever going to seed, and as often as once in two or three years apply a dressing of well rotted ma-

nure, or of ashes, or bone dust, early in spring. The practice of covering the surface with coarse stable manure, so common in villages, is offensive to good taste and not at all necessary.

Field Thrashing Buckwheat.—Where buckwheat must be thrashed by hand a floor may be prepared in the field by scraping and sweeping a piece of ground and laying down sheets, and lay over this a bed of rails an inch or two apart, raised from the ground sufficiently to make room for the grain when it is thrashed. On the rails throw the straw as it is brought, and thrash out the grain, which will fall through the openings between the rails. The straw can be removed and separated from the grain very quickly. When all is thrashed remove the rails and the grain may be cleaned on the ground if desired without removing it to the barn. Buckwheat should be cleaned as soon as thrashed.

Home Made Windmill.—It may be built by setting an upright post supporting an upright shaft having a hub on top carrying three horizontal arms, to each of which are hinged light rectangular frames covered with heavy muslin or light canvas, regulated to swing in one direction only, from horizontal to perpendicular.

The sails are carried with the wind, at right angles to it, and return edgewise against the wind. The post may lean two feet at the top, so as to shorten the connection of the upper box with it. The lower bearing may be in a post set even with the ground, under the upper bearing.

The pulley, four feet in diameter, secured near the bottom of the shaft, may have a smooth true groove for rope band burnt into its circumference by a crow bar, its one end resting in a hole in a post, the other in hand, while the middle in contact with the wheel is red hot.

Platform for Drying Beans.—Lay blocks in parallel rows, ten feet apart each way. Lay stringers of rails one way and cross rails every few inches and spread the bean stalks or vines thereon. Air circulating above and beneath will dry them quickly, and rain will do no injury.

Trees by a Residence.—Shade and ornamental trees are often set too close to the house. The limbs extend and chafe the windows and the paint, or if they are cut off, the symmetry of the tree is destroyed. Evergreens, almost without exception, are set too near the house, so that, after a few years' growth, their removal or destruction becomes necessary.

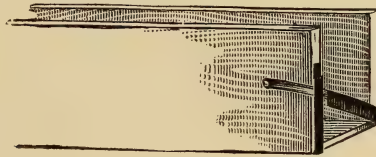
Trees which cast their shadows upon the house cause dampness in the rooms and render them unhealthy.

Decomposing Straw.—There are several methods adopted for decomposing straw; one, and in my opinion the most profitable, is to use it as a stable feed and litter in winter time; another is by scattering it in the furrow behind the plow, and covering it up; a third by spreading it over the surface of a field in the spring and burning it. By this means the heat destroys the upstart weeds and the ashes make a valuable fertilizer

I do not believe the full value of the material can be obtained by burning, as most of the worn land needs loosening up as well as strengthening, and straw is one of the very best materials for this purpose.

Mulching with Sawdust.—What experience I have had with this material would not lead me to value it very highly, save as a mulch for certain vines, trees and bushes. As a fertilizer for the soil, I should much prefer composting swamp muck, woods loam, etc., with what manure can be saved from the barn. Sawdust or tanbark sours the soil, unless thoroughly decomposed, and a long time is required to bring about sufficient change to make it a food for vegetable life.

Cutting Willows.—As to killing willow and elm trees, a farmer writes that a few years ago he had a grove of more than one hundred willows that he was anxious to be rid of. To cut them down would not do; he got by so doing ten to one. When the bark would peel freely, he went into the willow thicket with a sharp hatchet, cut the bark round the trees about four feet from the ground, stripped the bark downward to the ground, leaving it still attached to the trees. His willows all died during the summer, no sprouts springing up. He has treated white elms the same way with like success.



CHEAP ROOT CUTTING BOX.

Cheap Root Cutter.—Make a box with three sides of inch and a fourth plank, twelve or fifteen inches each way, and three feet long. Fasten it in position handy to work at, on a platform or upon legs; saw one end square and attach a knife. The knife may be made from a piece of scythe, a hole in one end and a shank for handle at the other. The cutting part should be long enough to cross the box. Hang the knife even with top edge of bottom board, one end held by a screw bolt, the other working in a slot of wood or iron.

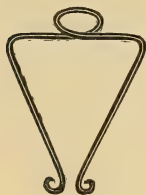
Washing Wheat for Seed.—An experienced grain grower says: "Take a common wash tub about two-thirds full of water, and pour into it half a bushel of wheat, and after stirring with a stick, skim or pour off what rises on the water, taking care not to let the good grain run out; then empty into a basket, or some vessel that will retain the wheat, and drain off the water; put it on a clean floor and sift or sprinkle on to it about a peck of dry ashes, stirring it over thoroughly so as to cover all the grains with the ashes, and serving the whole quantity to be sown in the same way.

"After it has lain a few hours it will be ready for sowing. It has proved a

sure preventive in every case of trial with me, but when it has been omitted there has been plenty of smutty grain."

Dooryard Decoration.—No one can fail to see that a purchaser would give more for a farm where taste has been displayed around the house and out-buildings, than for one equal in acres, location, etc., where no attention has been paid to these things. But, aside from all pecuniary considerations many reasons are apparent to every intelligent person why this work of house embellishment should be done. It renders home and whatever appertains to it attractive—suggestive of pleasurable thoughts, and a sanctuary of hallowed association; this is an inducement sufficiently powerful to lead all thoughtful people to endeavor to render every appearance in accordance with good taste.

Iron Gong for the Farm.—Take an inch and a quarter rod of iron and bend into the form of the accompanying diagram, and suspend it by the loop in the center. The length of each arm should be about four feet, and when struck with a hammer, will produce a clear sound, easily heard a full mile, and with the wind nearly two miles. The ends are to be turned round into a circle of about four inches in diameter, and gradually brought to a point. A different number of blows will give different signals to the husbandman. One series for dinner, another for visitors, another for fire or danger. The difference



FARM GONG.

between the sound of the blows produced by an iron hammer and wooden mallet may be noted especially to distinguish the emergency of the case—the sound produced by the wood being heard as far, but not nearly so shrill and sharp.

Ventilating Attics.—Holes bored under the cornice, to communicate with the spaces between the rafters and over the ceilings, and then one or two small wooden ventilators on the roof, will be sufficient to insure a constant current of air over the entire upper story of the building. Also, small ventilating registers placed in the ceilings would—in connection with the others—insure the most thorough ventilation of the rooms. Of course, the holes in the cornice could be closed in winter.

Keeping Farm Accounts.—There is no particular profit in keeping receipts and expenditures on the farm, for it does not increase them on the one hand or diminish them on the other; the final result remains unchanged. There is, however, a plan of keeping accounts with the farm which every husbandman could make pay richly.

If when any field is put to a certain crop the expense of labor, seed and harvesting are kept, and the value of the return, the farmer could determine whether there was a paying investment in the growing of that certain crop, and by comparing field No. 1, put to wheat, with field No. 2, which grew corn, it could easily be determined which give the best returns, and so with all other crops grown upon the farm,

Any farmer who adopts this form of keeping accounts with his fields and stock, will find after the first year his ledger his safest guide—this I know from the practical experience of years—and he will give testimony in favor of the plan, after testing it, and of the utility of recording experiments.

Cultivating Blackberries.—In the culture of blackberries, I have found it of advantage to omit stirring the soil after midsummer, so that the plants may make less growth in the latter part of the season and thereby be the better able to endure the winter.

Fallacy in Farming.—In his report, the Commissioner of Agriculture says: "The greed for the acquisition of land is a serious bar to progress in farm improvement. The aim of the pioneer has been, not to become a good farmer, but a holder of broad acres—to grow more wheat, to buy more land. The result is a sparse settlement, poor roads, straw stables, few farm implements, and a slow advance in prices of real estate after the first sudden rise in values. It is a dangerous fallacy that non-productive farm lands are profitable."

Keeping Fruit and Vegetables.—"It is a fact well known to the experienced horticulturist and pomologist, that fruit and vegetables stored on shelves in a room well ventilated with fresh air will keep fresh and sound much longer than when stored in barrels or cellars, which is the ordinary practice; the barrel mode of preservation is only suitable for small families, not for the orchardists who produce hundreds and thousands of bushels in a single season.

"Fruit so kept acquires a rind of wilt, which makes it much more valuable for shipping or marketing purposes, especially if held late in the spring, at which time nice, large, smooth fruit frequently commands quite satisfactory and paying prices. It fails to melt down or rot when exposed for sale, like that kept in barrels or cellars."

Sumac for Tanning.—"Sumac alone is not adapted to the tanning of sole or upper leather, on account of its highly astringent properties and its tendency to sour quickly, the heavier leather requiring a more moderate agent for its preparation; but it may be used in connection with either oak or hemlock bark, and is employed in that manner by tanners.

"It must be dried for use. In a green state it sours too quickly. A full month is necessary to properly cure it under cover. It should not be thrown on a tight floor; let the air circulate under it. Throwing over occasionally with a pitchfork improves it.

"In using sumac for making fair or light colored leather, allow about a pound of leaf sumac to a side of leather, but this depends on the strength of the article, and of northern grown sumac more should be used. Handle in this a day or two and then go through the regular process of tanning with bark, and the result will be a soft, pretty leather."

Doing Up Wool.—Provide a table large enough to hold a fleece of wool

when it is spread out to full breadth. Lay the fleece upon the table outside up; trim off all the dirty tags and fold in the sides, then turn in the ends. As it lies now in a square form, all bits of clean wool or washed tags may be added; then the fleece folded until about ten inches wide, then rolled from one end to the other firmly, but not so tight as to cause the fleece to separate. Now, holding the fleece securely, tie with wool twine in a workmanlike manner, putting on no more string than is necessary to hold the fleece in good shape.

A box is used by many. An ordinary eight by ten glass box answers a very good purpose, but one made of light wood boards, smoothly planed, is better. After the box has been prepared—open at two sides—saw two kerfs on edge of longest side an inch or so deep, two or three inches from ends, then one in center of the two other sides. These are for the purpose of holding the twine. Cut the twine into proper lengths and have them hang at edge of table. After supplying the box, roll the fleece as before directed, and crowd it in and tie, then push it through. The fleece should be put into the box so that the two twines will wrap the way the fleece is rolled.

Quantity for a Car Load.—Often people are anxious to know what constitutes a car load, and I annex the following for the benefit of any who may desire the knowledge. The figures may not exactly suit everywhere, but approximate so closely to a general average that shippers will find them a great convenience as reference :

As a general rule, 20,000 pounds or 70 barrels of salt, 70 of lime, 90 of flour, 60 of whisky, 200 sacks of flour, 6 cords of hard wood, 7 cords of soft wood, 18 to 20 head of cattle, 50 to 60 head of hogs, 80 to 100 head of sheep, 9,000 feet of solid boards, 17,000 feet of siding, 13,000 feet of flooring, 40,000 shingles, one-half less of hard lumber, one-fourth less green lumber, one-tenth less joists, scantling, and all other large timber, 340 bushels of wheat, 360 of corn, 680 of oats, 400 of barley, 360 of flax seed, 360 of apples, 330 of Irish potatoes, 356 of sweet potatoes, 1,000 bushels of bran.

How to Make a Dowel.—In doweling, one of the pieces of wood to be joined to the other has a pin of wood or iron inserted in the end at a required distance, according to the timber, and the other stick has a corresponding hole drilled in its end to receive the pin. Before boring the dowel hole, use a gauge upon the two face sides of the sticks. Bore the holes where the lines cross, and put a pin firmly into one of these, then drive the work together.

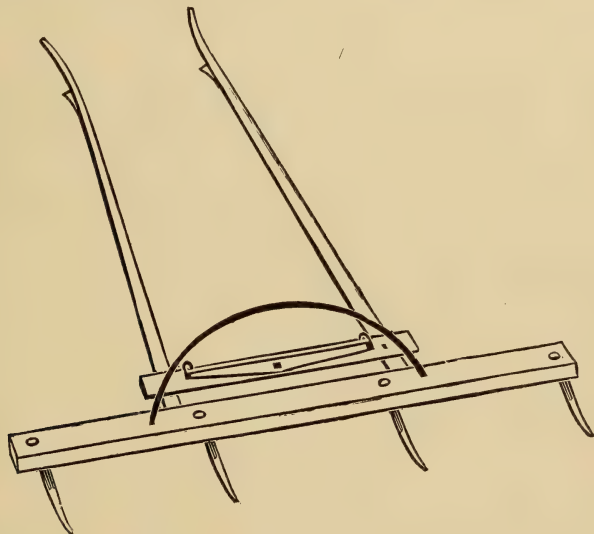
Gathering Woods Dirt.—When going to work with wagon near the wood lot, take along a shovel and carry home at noon and at night a load of forest loam, or else set apart a day and devote it entirely to the purpose of collecting. Woods dirt is one of the very best mulches that can be used; it is one of the best absorbents for the stable, and as a loosener and fertilizer for soil it cannot be excelled. It is good upon any and all kinds of soil and as cheap as the air.

Leaves and loam form an excellent material for house banking and for cover-

ing vegetables buried in the fields or garden. Nature has designed the fallen leaves as a shield to the tree roots against the frost; a thin coating being almost impervious to that element. They are, therefore, exactly fitted for the use above mentioned. No better manure can be used upon the garden, as it will make the soil light, airy and at the same time give it the primitive qualities of fertility.

How to Kill Gophers.—These ground squirrels are very troublesome on the prairie lands, and a Western paper says the best way to dispose of them is to take a potato, and cut it into about an inch or less square, and put a few grains of strychnine, say as much as half a pin's head in bulk, upon each piece and rub it in with a knife; dig down and deposit these in their trenches, and cover over again, and you will probably not hear from the gophers.

Cheap Corn Marker.—Take a scantling or light, straight pole, twelve feet long, and put into the same four teeth, inclining backward, a pair of poles or sawed thills, and a handle made by bending a green hickory stick over, as shown in the engraving. Put in the thills three feet apart at the scantling and twenty-two inches apart at the small ends. A cross piece may be bolted on a



CHEAP AND HANDY CORN MARKER.

few inches front of the scantling and the whippetree rest upon that, or the whippetree may be attached to the scantling at the center of the space between the thills, by means of a trace chain, or no whippetree used at all. The tugs may be hitched to a hook driven into the scantling near the thills. I much prefer the whippetree, as it gives play to the harness and prevents jerking and chafing.

After framing in the thills, elevate the scantling twenty inches or two feet,

and support it there. Elevate the ends of the thills to about the height they will be when supported by the harness, and then get the backward pitch for the teeth. Put a tooth six inches from each end, and the other two three feet eight inches apart. This will bring all the teeth that distance apart if the scantling is just twelve feet long. Instead of the bent handle, two old plow handles may be put in, or two upright sticks with a cross stick.

In putting in the handle, be careful and not get it too high, for it should be low to lift the implement easily when at the ends of the corn rows. The lifting of this marker is where the advantage will be found in its use. When sleds or runner markers are employed, it is a difficult thing to turn and set them for a return trip across the field. When the runner marker gets out of place it is difficult also to adjust it, while the tooth marker may be gradually varied by side pressure, or quickly adjusted by lifting it bodily up.

The Wheel Corn Marker.—A wheel corn cultivator may be reconstructed so as to make a good marker. Attach two shovels to it three feet eight inches apart—eight inch shovels—which will make a good mark for a horse to walk in. In that way one can ride all day and mark out from ten to twelve acres.

To Prepare Broom Corn Seed.—To prepare broom corn seed ready for the planter, take a small punch that will make a hole a trifle larger than the largest broom corn seed, and with it punch a six quart pan full of holes, from the upper side; put the seed in this, and rub or grind it through with a piece of inch board about four inches square. With this simple arrangement, seed enough may be prepared for one hundred acres in a short time.

To Make Charcoal.—Charcoal can be obtained by burning wood in a conical pile, covered with earth so that the combustion shall be slow, owing to the small quantity of oxygen admitted. If wood is burned in the open air, only ashes are the result.

Preparing Vineyard Land.—Vineyard ground needs no other preparation than a deep plowing. If the land is in sod, all the better, for in August, just when the growing vines demand the most of moist food, that sod will, as it decomposes, furnish what is wanted. Speaking generally, if a soil needs trenching, it is not suitable for profitable grape culture.

Brushing in Clover Seed.—An agriculturist says: "Sow your clover seed with spring barley or oats (the former is better) immediately after harrowing the last time, which should be thoroughly done, to have the ground well pulverized. Instead of the harrow, which will cover the seed too deep, cut a large round brush (honey locust is good), lop the inside limbs to make all bear alike on the ground, and brush your clover seed in the same as you would harrow your barley or oats.

"A quantity of seed sown in this way on nine or ten acres of ground will make your clover thicker than the same quantity of seven or eight acres of wheat

ground left exposed to the drought, and to the chances of falling into the cracks into which half of it never finds a resting place."

How to Kill Burdock.—Some one who has been afflicted with this troublesome plant, says he kills it by cutting off the roots a few inches under the ground with a spade, and then throwing in the hole a handful of salt or quicklime. The time he chooses to kill them is after the flower buds appear on the stalks. Simply severing the roots would probably kill them, but he wanted to make sure work.

Plowing out Corn.—It is almost fatal to a corn field to neglect thorough culture in its first stages of growth. One day's work in a field when weeds have just begun to make their appearance, is worth more to the crop than three after they have become thoroughly rooted. Besides, success very much depends upon the first start of the crop; any plant checked in its early growth will never recover. If corn is kept clean, and the ground loose during the first four weeks of its growth, a greater yield will be obtained than through working it twice that time at a later period.

Peat for Ice Houses.—It is said that one of the best materials for ice houses is peat; but the genuine moss peat must be employed, which should be cut in pieces fourteen inches long and five to six inches wide and thick. When it is thoroughly dried it proves to be a poor conductor of heat, and when laid up around ice houses above the ground, is preferred by many persons to sawdust, tan bark and the like.

Cheap Fruit Picker.—For picking off small trees that cannot be climbed or reached by a step ladder, a cheap and efficient picker can be made by cutting a circular bottom ten inches in diameter out of an inch board. Bore half inch holes one and one-half inches apart, and three-fourths of an inch from the edge around it. In the holes put flat pointed pins eight or ten inches long and mount upon a handle of sufficient length, at an angle of thirty degrees, to reach up and pick or let down the apples without spilling. By passing it under the apples and upward so the teeth will pass over the stem, a gentle rub onward will take the apple off as safely as if done with the hand.

To Prepare Osage Orange Seed.—A farmer who has had twenty years' experience in hedge growing says: "Soak the seed two weeks, and if the weather should be unfavorable for planting, the seed will not be injured by remaining a few days longer in the water. I have known seeds that had been thus soaked to come up after having lain in the ground one year; a good crop having been produced the first year, a few plants would make their appearance the next spring.

"This discovery induced me to put some ashes in the water in which the seed is soaked. The result was about twice as many plants as had been produced from the same amount of seed without ashes. I put about four tablespoonfuls of ashes to one gallon of water.

"It is difficult to say how thick the seed should be scattered in the row, because you do not know what proportion of the seed will grow. I would sow at least twenty-four seeds to the foot in length of row. I never planted seed that came up too thick; they will bear to stand quite close together."

Watering Garden Plants.—Watering garden plants, as commonly practiced, is an absolute injury to vegetation, for the reason that it is not done plentifully enough. When the earth is dry and hot, the application of a little water only increases the heat, and has a tendency to make the soil more compressed and drier than before. The most of our soils are more or less calcareous, and the action of the sun's heat has the same effect as heat upon limestone; the carbonic acid is expelled, and when brought in contact with moisture, heat is generated, and unless sufficient water is applied to overcome the heat, vegetation suffers.

A sprinkling pot should never be used in time of drought, unless the soil around the roots of the plants is at the same time thoroughly soaked, and the watering should always take place after sunset, when the dew has begun to fall. This is in accordance with natural laws. Rain and sunshine seldom appear together; and further, when nature waters vegetation, the atmosphere is filled with moisture.

Pool water and soap suds are good for the garden, and cistern water may be used, but should be exposed to the sun and air through the day before applying. Strong liquid from the barn-yard is death to garden plants, and should only be used after diluting until very weak.

My plan of watering to avoid making a hard surface crust around the plants, is to dig three or four holes on the different sides of the hill, a few inches away, and into these pour not less than one pailful of water, and after all has soaked in, replace the dry earth, and then with watering pot sprinkle the tops.

I have many times carried cucumber and other vines through severe drought, and received a bountiful yield from them.

How to Use Windfall Apples.—Windfall apples should be carefully gathered and fed out. They are not valuable for cider, or very profitable in a raw state as swine feed unless sweet. If sour apples are boiled and mixed with whey, sour milk or table slops and have a liberal supply of corn meal added, a good starting feed for fattening hogs is made. One of the profits derived from getting rid of windfalls is the destruction of myriads of apple worms that would otherwise undergo transformation and appear to destroy the crop of next season.

Hoing Potatoes.—One of the secrets of success in potato growing is in giving them a hoeing at the proper stage of growth; one hilling is sufficient, and this should be given when the vines are about six inches high. Previous to this use the cultivator freely—keep the earth loose on the surface and free from weeds. When at the stage of growth mentioned, give a good hilling,

making the mound broad and flat on top and a little cupping ; after this, do no more than to cut out weeds. The hoeing is best done soon after a rain.

Some advocate flat culture and others two hillings, but I have never succeeded with either of those plans, nor do the most successful potato growers advocate them. Two hillings will make two settings, and result in a large number of small potatoes at harvest time. Flat culture may do on a deep loamy soil, where the roots can ramify and form tubers readily, but a clay soil hilling in the old fashioned way is the one most certain to make good returns.

Application of Hen Power.—A farmer writes that he utilizes the natural tendency of his hens to scratch by letting them do the work in his garden. He makes long, narrow cages, just wide enough to fit between his garden rows of vegetables, etc.; has slat sides, board tops, and open bottoms. In these cages he puts his best dirt throwers and lets them hoe out the patch. When the ground is well torn up, he moves the cage along, and in this way keeps the earth mellow and the garden free from insects.

To Poison Meadow Moles.—Get a small amount of arsenic ; put it in an old tin can with some water, and then put in some corn. Let the corn soak until morning. Now take the corn, and make little holes through into the moles' burrowed roads, and dropping the corn through, cover up the holes lightly. Do this and you may depend upon it that Mr. Mole will not come round many times more.

Heading Peach Trees.—The peach fruit is borne only on the shoots of the previous season's growth, and unless the production of young shoots is secured by the healthy growth of the tree, good fruit cannot be expected. In order to secure a more plentiful growth of young wood, it may be advisable to cut off occasionally a portion of the tops of peach trees of bearing age, especially when their growth seems to be checked, and after bearing a full crop of fruit. This is called "heading them off," and consists of cutting off all the limbs or branches at from one-third to one-half of the length, thus removing one-half or more of the tops. This will cause them to throw out new shoots and form new heads, with better foliage and finer fruit—especially if in the spring a dressing of ashes or manure is applied to the land, and fair culture bestowed.

Pruning of peach trees is usually deferred until spring, so as to give opportunity to observe the effect of the winter upon the fruit buds, as severer pruning is given when there is little or no prospect of fruit.

To Propagate the Quince.—Take cuttings from good stout scions. They will grow as readily as a grape cutting ; set them in boxes filled half full with rich soil, and half with wet sand, plant the cuttings in the sand and they will quickly strike root. Cuttings can be planted along the margin of a hot bed, or even in the open ground.

How to Produce Stoneless Fruit.—At a meeting of the Agricul-

tural Society in India, the Rev. Mr. Firminger communicated a plan by which the stones of fruit may be reduced or made to disappear, and the pulp increased in size and flavor. At any time during the cold season select a branch that is to be used afterward for inarching. Split it up carefully somewhat less than a span long. From both halves of the branch thus split, scoop out cleanly all the pith; then bring the split halves together again and keep them bandaged till they have become thoroughly united.

At the usual time, the beginning of the rains, inarch the branch thus treated upon suitable stock, taking for the place of union the portion of the branch just below where the split was made. Upon a branch of the tree thus produced a similar operation is performed, and so on for successive seasons, the result being that the stone of the fruit becomes less and less after each successive operation. This process has been applied likewise to the grape-vine at Malaga, and plants thereby have been produced which bear the finest fruit, without the slightest vestige of a seed within them.

- **Peach Trees from Pits.**—It is useless to attempt to reproduce an excellent and desirable variety of budded peach fruit by planting the pits of the same. The Early York or Crawford peach stones are as likely to produce worthless fruit, or clingstone, as any other. Occasionally the fruit will have characteristics of the parent pit, but it cannot be depended upon.

Mapping Grain Fields.—It is very seldom that a cultivated field is found so even in its fertility over the whole surface that it is equally productive on every square rod, and it is a rare thing indeed to find a meadow where every section produces the same amount of hay annually; and it is for the purpose of equalizing this, or, in other words, bringing the poorest parts up to a condition of the best, that I suggest mapping each field.

There is no time that the correct observations can be taken as to the productiveness of fields so well as when there are growing crops upon them. By going over the wheat field at this time, the poor spots may be very readily marked out so that improvements may be made when the crop has been removed. If the grain has been winter killed on a certain portion and not on another, some cause may be assigned, and that cause remedied in future.

To Break Up a Sitting Hen.—Take the hen and shut her up; after a few days she will forget her desire to sit, and commence laying again. Some times dipping fowls into water will prevent their returning to the nest, but where they are persistent the cooping plan is the quickest, and makes the least trouble. The coop should be large and airy and the fowls supplied with plenty of appropriate food.

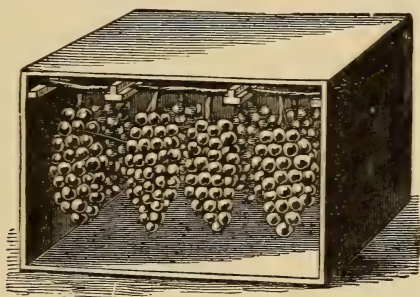
Husking Corn in the Field.—It is a much better plan to set a wagon in the field when husking, and when filled going to the crib with it, than to throw the corn upon the ground to be gathered up afterward, for two reasons: First, one half of the handling is saved, and second, the corn is not exposed to

damage by being left out in the field through a storm, which is very commonly done by miscalculation when not drawn and cribbed as fast as husked.

Test for Good Farming.—Horace Greeley once said that the fairest single test of good farming is the increasing productiveness of the soil. “That farm which averaged twenty bushels of grain to the acre twenty years ago, twenty-five bushels ten years ago, and will measure up thirty bushels to the acre from this year’s crop, has been and is in good hands. I know no other touchstone of farming so unerring as that of the increase or decrease from year to year of its aggregate product.

“If you would convince me that X is a good farmer, do not tell me of some great crop he has grown, but show me that his crop has regularly increased from year to year, and I am satisfied. Keep your eyes on the farmer who almost uniformly has great grass, good wheat, heavy corn, etc., and unless he drinks, or has some other bad habit, you will find him growing rich.”

To Make a Grape Box.—A very good way to keep grapes in small quantities is to hang them in not over large boxes. One may use the common soda cracker boxes, such as can be obtained at any grocery store. Nail a cleat on two sides near the cover, then if the grapes are cut with vine wood, put double cleats between, as represented in engraving; if not, put cross cleats, six inches apart, and hang the clusters to them by use of strings.



CHEAP BOX FOR KEEPING GRAPES.

The advantage in this method is in being able to change the fruit from one room to another without handling; also, to keep the grapes from coming in contact with each other and molding; and still further, defective fruit may be picked off at any time without handling the clusters.

Hoops for Grape Keeping.—A very simple device for keeping grapes is made of common barrel hoops. Suspend three strong cords or small ropes to a single staple in the upper wall of the fruit room, then spread them and attach the hoops, one foot or less apart, one above another, horizontally, the ropes at points equal distances apart. When the rack is completed, bunches of grapes may be hung to the hoops and looked over at will. It is better to

have hoops of a little difference in size, if convenient, as it brings the ropes into a natural position and allows the hoops to be a little nearer together.

To Pack Grapes for Market.—Pick when dry. Cut the stems with a sharp, hooked knife; pick off all defective grapes, then pack in boxes, light and strong, a foot by a foot and a half in size, five inches deep. Such a box will hold about twenty pounds if properly packed. "Set the box on a table of convenient height, having the back end of the box elevated three or four inches by placing something under it," says a vineyardist; "then commence at the end next to you and lay the bunches in carefully, pressing them together gently, but not hard enough to break the berries.

"When the bottom of the box is covered one layer deep, commence at the front again, put in a second layer, placing the larger bunches in the low places and the smaller bunches on the high places, thus keeping them as level as possible; proceed in this manner until the box is full, being careful to have the box as level as possible when done. Cutting bunches to fill up cavities is not a good practice, as large bunches sell best.

"The boxes thus filled should be allowed to stand until the stems of the grapes are wilted and become pliable, which will take from six to twenty-four hours; then take a board and cover the box, placing one hand under the box and the other on the cover; then set the box on end, holding the cover securely in its place with one hand, then shake or jostle the grapes until they settle compactly together, which is easily accomplished after the stems are wilted; this will cause a cavity at the upper end of the box, which should be carefully filled with grapes that have had stems wilted, in order that they may pack closely.

"Great care should be taken to avoid rubbing the bloom off the grapes, as it injures their appearance, and it is thought they will not keep so well. Care should also be taken to hide the stems of the last layer and have the stems look even or level on the top. Grapes should not be allowed to stand in the sunshine after they are gathered."

Baskets for Grape Keeping.—My plan has been to pick the fruit carefully, when ripe and dry, into shallow baskets or boxes, and put them in a well ventilated loft or chamber for two or three weeks to let some of the moisture evaporate, then lift the bunches by the stems and pick off any defective berries, and pack in shallow boxes or drawers, only two layers in each, with a layer of cotton batting between and on the top. Dry sawdust will answer as well as cotton, but it is more difficult to remove entirely from the fruit. Then keep in a cool chamber until danger of freezing, and afterward in a dry cellar.

Cobs as Stock Feed.—If corn is not thoroughly dried there is some nutriment in the cobs, and they may be fed perhaps with some little profit; but when the corn is thoroughly dried, most of the nutritious matter has been taken up by the grain, and, in my opinion, the cobs then are about as valuable for feeding as sawdust.

Non-Productive Soil.—Soil that is commonly called barren has not lost its elements of fertility to that extent most people suppose. Its non-productiveness is owing, in part, to compression ; if lightened up, so that the atmosphere can circulate freely through it, a fair crop will, in most cases, be realized. Clover, as a loosener, is excellent.

Lumber for the Farmer.—Loose lumber is always needed about the farm ; almost daily a board is wanted to make repairs on buildings, fences, etc., and no one can obtain this material cheaper than the farmer. At nearly all of the mills, the proprietors are willing to saw logs for one-half the lumber, so take two and bring home the products of one, if money cannot be afforded to pay the saw bills.

Ventilator for a Hay Mow.—To make a ventilator in a hay mow prepare a square box about five or six feet long, and sixteen or eighteen inches square, of thin boards, and place it where a flue is to be made in a mow, and draw it up as the mow is built. The top of the ventilator should be left open. The tube may be kept from dropping into the flue by nailing on a piece of board near the bottom, when mow is done. Then pile hay around tube until it will stand alone. By this means an efficient ventilator will be formed.

By thus letting cool air into the middle of a mow or stack, hay that would otherwise "mow-burn" will be kept cool and will save well. A barrel is sometimes employed for making a ventilating flue. The barrel must be drawn up a few inches at a time as the hay is stored around it.

Protecting Trees From Animals.—Drive four stakes about a foot distant from the tree. Saw off to equal heights and nail on cleats, forming a square to hold the stakes firmly at the top, then put hoops of wire around the stakes eight or ten inches apart. The wire need not be large, and may be twisted tight, or held in place by cutting small notches in the stakes. The expense is but a trifle.

How Barns are Burned.—Oily rags and cotton waste for wiping machinery are common causes of spontaneous combustion. Oil spilt on dry sawdust has been known to take fire in this way. Oils that oxidize readily, like cotton seed oil, are especially liable to take fire without apparent cause. Hay, cotton, tow, flax, hemp, rags, leaves, spent tow, straw in manure heaps, all are liable to take fire spontaneously when stacked in quantities in a damp state. These are facts which every one should understand, as the knowledge of them may, in many instances, lead to precautions of the utmost importance and saving of valuable property.

Old rags used for wiping off machine grease, or those saturated with oil when doctoring some sick animal, should never be thrown down carelessly when the work is finished, or tucked in any box or tight place. Hang them up where air will circulate about them freely, else throw them out of doors or burn them.

Weighing Corn.—In selling corn in the ear, the weight allowed for a bushel of shelled corn varies considerably—ranging from sixty-eight to seventy-two pounds; the latter when the corn is not well dried; the former for good corn late in the season. Test lots selected showed a weight of a little less than twelve and a half pounds of cobs for each bushel of shelled corn; or sixty-eight and one-half pounds in the ear would give fifty-six pounds of shelled corn.

Scraping a Barn Yard.—At midsummer, or at any time when the earth is dry and hard, is a good time to scrape the barn yard. Where cows are yarded during the night, or even at milking time, there will be considerable of an accumulation of droppings, and in summer but little can be trod into the earth. By the use of a road scraper a large quantity of manure can be saved from a yard where a good sized dairy is kept, and enough to doubly pay for the trouble and extra labor where very few are yarded.

A small yard may be scraped with a common barn shovel, but under ordinary circumstances it will pay to procure a one or two horse road scraper. The work can be the most effectually done immediately after a good rain, when the surface is well moistened, but should not be attempted when the ground is wet and soft. Many loads of excellent fertilizing material are trod into the earth every season and lost by simply neglecting to scrape the barn yard.

Manure Mallet.—Upon a handle of hard wood, two feet eight or three feet long, put a head made of a piece of four inch round pole, cut as illustrated,



MANURE MALLET.

With the sharp end droppings upon a meadow can be loosened up, and by a blow from square end scattered in particles over the ground.

Door Catch.—A piece of board some five inches long, two and a half wide, cut as illustrated and screwed loosely upon a barn or house floor, where



FLOOR DOOR CATCH.

no carpet is used, makes a good fastener to keep a door open. Place the catch where the door is to be held, and then work it by a touch of the foot.

Cutting Back Raspberry Bushes.—In planting raspberries they should be cut down nearly to the ground when planted. You lose the crop, of course, but you get good strong canes for next year. If you leave the cane

long enough to bear, it will probably be the only crop you will ever get from them. Never expect anything to bear the year after transplanting. It is generally at the expense of the future health of the tree.

Tomatoes from Cuttings.—Elliott says to produce earliest ripening tomatoes, just before frost take cuttings from the old plants and keep them in sand, or in sharp, sandy soil during the winter in a cool, dry cellar. The cuttings should be made from the base of the old plants just above the main roots, taking at the base end of each cutting about four inches of the stem, from which new fibers as rootlets have started, and then making the cutting so that it will have two or more leaf buds above the rooted end.

Usually the cutting will be about ten or twelve inches long. It should, as soon as taken off from the main or old plant, have its fibrous end at once planted in a pot or box of sand, or sharp, sandy loam, given a good watering and then set away in a cool place, say in a dry cellar or under the stage of a greenhouse. These cuttings started into growth in the latter end of February, by placing them in the south windows of a warmly kept living room, or placed on the shelves of the greenhouse or in a hot-bed frame, will give fruit two to three weeks earlier than the best plants that can possibly be grown from the seed.

A Simple Weather Glass.—The *Journal of Applied Chemistry* gives the following on making a simple barometer :

Take a glass tube about ten inches in length and one inch in diameter, fill it nearly up to the top with the following liquid : Two parts camphor, one part nitrate of potash, and one part sal ammonia, dissolved in strong spirit of wine ; then add water until you have partially precipitated the camphor. The extremity of the tube can be left open or hermetically closed. The glass tube thus prepared is then fixed in a horizontal position against the wall or a board.

The changes in the weather are thus indicated :

1st. If the weather is to be fine, the composition of the substances will remain entirely at the bottom part of the tube, and the above liquid will be perfectly clear and transparent.

2d. Before the weather changes to become rainy the precipitate will rise by degrees, and moving crystallizations, similar in shape to stars, will be seen.

3d. When a storm is imminent, the precipitate will nearly all rise to the top of the tube, assuming the shape of the leaf, or an assemblage of crystals ; the liquid will appear to be in a state of effervescence. This change very often takes place twenty-four hours before the change in the weather.

4th. The side from which the wind will blow in a squall will be also indicated through the direction and the elevation of the crystallization in the tube, the crystallization always forming on the side from which the wind will blow.

5th. In the winter season the crystallization will maintain itself higher in the tube ; snowy and freezing weather are also indicated by the particles of the substance floating in the liquid and assuming the shape of long, hairy needles.

6th. In summer time, the weather being dry and warm, the crystallizations will have a tendency to remain lower in the tube, and the liquid will also be more transparent.

The amount of crystallized particles which will be seen floating in the liquid, as a sure indication of fine or bad weather, will depend entirely on the suddenness of the change in the weather which is to take place, acting in the most energetic way on the composition above described.

The value of this simple instrument to forewarn of an impending storm, and also to indicate the continuance of fine weather, will be readily appreciated by those whose occupations are affected by the changes in the weather. See Home Made Barometers, page 235.

Press for a Barrel.—There are two cheap ways of making a heavy pressure upon the contents of a barrel. One is to set the barrel beneath a sill or sleeper in the cellar, then have a piece of scantling extend from the follower up to the sill, and get downward pressure by wedging at the top from opposite directions. The second and better way, is to put a staple in the floor, attach a chain to this, then set the barrel near the staple, lay a long scantling across the barrel so that one end is over the staple, and attach the chain. Block up on the barrel follower, and a heavy pressure may be obtained by weighting the long end of the scantling.

To Make an Ice Chisel.—An ice chisel is a handy implement, very frequently, for winter fishermen, and may be easily made by knocking the handle off a two inch chisel and putting on a hoe handle with ferrule upon the end.

To Imitate Japan Work Boxes.—Dissolve white beeswax in spirits of turpentine until it is of the thickness of copal varnish. This may be kept in a bottle until you are ready to begin the work, when you may pour out a small quantity and mix into it a little flake-white sufficient to give it a body. Now, with a fine sable pencil trace accurately the design on the white wood, which has first been made very smooth and clean, and go over every part of the pattern, leaving only the groundwork untouched.

When this is thoroughly dry, dress over the whole surface with prepared ivory black paint. It may be obtained in small cans at any paint store for a few cents. Let the whole get thoroughly dry, and if it is not well covered, give it another coat. When this is dry, let the whole work be brushed with a bristle brush dipped in spirits of turpentine, and rubbed pretty hard, until the parts covered with the white mixture are left bare. The designs first traced will now become visible, with sharp, clear outlines marked on the black ground, and will look very handsome. It must then be varnished with white varnish, and rubbed down with pumice powder until very smooth. If one prefers, the ground part may be made of a coral color, by using red sealing wax dissolved in alcohol. The expense of this work is a mere trifle, and anyone can do it who can trace the design. As an aid to this work, see "How to Copy a Scroll," page 155.

THE HANDY HOUSEWIFE

Every lady is endowed with something of a mechanical gift, and no one is so entirely devoid of it, but what by the exercise and development of that which is possessed, very material comfort may be added to home life. I do not suggest that the coarser parts of mechanical work be attempted, but that the genius possessed be exercised to the enhancement of beauty and domestic enjoyment. By many, the important principles in the mechanical construction of different things in use are overlooked, and these faults are manifested in the household, and though seemingly small, are nevertheless of great importance, inasmuch as they are woven into the very web of domestic life, and have an effect upon the habits and characters of the younger members of the family which will not be easily eradicated.

Whatever is closely associated with every day life has a marked, and, I may say, a wonderful influence upon the mind. A looseness of habits has an immoral effect, while order, neatness and perfectness in all avocations soften and refine the feeling, elevate the mind and cultivate a taste for perfect work in all things.

In very many houses may be found articles of furniture that have stood for years looking dingy and rough. They have been and are now allowed to remain in that unsightly condition, because the good housewife does not know that it is in her power to beautify them, and the husbandman avers that he has other things, and those of more importance, to attend to. A housekeeper is naturally just as proud of the appearance of her rooms as a man of his horse and carriage, and she would gladly fix them up, or have the work done by some member of the household, if the *modus operandi* were understood. Where people are wealthy, they can send their damaged articles away for renewing, but those in moderate or cramped circumstances shrink from the expense.

To make a home pleasant and attractive, a great outlay of money is not necessary. I have seen many a country house made more inviting by the deft fingers of the lady occupants, than many city parlors and drawing rooms, where thousands of dollars have been expended in dark, heavy articles, to be enveloped in the shadowy gloom of an illy lighted room. Gold would be no more valuable than brass if it were as plenty; and so many of the expensive articles of ornamentation have their value in scarcity, instead of absolute beauty.

There are a great many articles that may be made or reconstructed at home, costing little, yet convenient and beautiful; there is daily something getting out

of repair which the owner should know how to fix and make as good as before, for in this there is a saving of money as well as a consolation of being master of the situation. As an aid to the masses this work has been prepared, and in the following pages will be found simple, practical instructions in all the various departments of the housewife's employment which are of a mechanical nature.

FIXING UP FURNITURE.

Varnishes for Furniture.—Many who have attempted the use of varnish failed to do a good job, and do not try again ; they doubtless did not half prepare the articles for the dressing and used a cheap varnish. Varnishes are composed of different gums and resins, which are generally soluble in alcohol. Many of them are made by dissolving the materials in alcohol, so as to liquefy them, and then when they are applied the alcohol evaporates, leaving the gum or resin in a thin, even coating over the surface.

If now any alcoholic substance comes upon such a surface, whether it be alcohol itself, as used for lamps, or spirits of any kind, or even wine, which contains but a small percentage of alcohol, a portion of it is dissolved, and the brilliancy of the surface destroyed. None but the very best turpentine varnish should be used, and before this is spread, wash the wood in saleratus water, and wipe dry with a cloth dampened with alcohol.

The varnish should be thinned with spirits of turpentine until it will flow easily, and spread in a clean, warm room, but not near a hot stove, for strong heat will cause the varnish to blister. Use a thin, flat brush ; do not try to get on too much of the varnish ; spread evenly and work rapidly, finishing as you go along ; never attempt to improve the surface half a minute after you have gone over it. See article on "Varnish and Varnishing," page 168.

To Remove Spots from Furniture.—To remove ink from furniture, wipe the spots with oxalic acid ; let it stand a few minutes and then rub well with a cloth wet in warm water. To restore paint and mahogany, wash with hartshorn water. Carpets are also improved by putting hartshorn in the water when mopping them. To remove white spots from tables or other furniture, rub the part with camphor, and they will disappear. Where a whitish mark has been left on a table, by carelessly setting on a pitcher of boiling water, or a hot dish, pour some lamp oil on the spot and rub it hard with a soft cloth. Then pour on a little spirits of wine or cologne water, and rub it dry with another cloth. The white mark will thus disappear, and the table look as well as ever.

Before dust or spots of mud are removed from any varnished surface, they should be rendered soft with water, so that the grit will not scratch the pol-

ished surface. Oils will not attack either marble or varnished surfaces, and will do no injury except to naked wood or other porous substances which admit them into the pores, from which they cannot afterward be easily expelled.

Where crimson upholstery has been worn threadbare and a light spot appears, take a steel pen and crimson ink and touch up the spot. If the cloth is black, use black ink ; if blue, use indigo, etc. In this way unsightly spots may be made to disappear.

To Take Out Bruises.—Wet the parts with warm water ; double a piece of brown paper five or six times, soak it in the warm water and lay it on the place ; apply on that a warm, but not hot, flat-iron till the moisture is evaporated. If the bruises are not gone, repeat the process. After two applications the dent or bruise will be raised to the surface. If the bruise be small, merely soak it with warm water and hold a red hot iron near the surface, keeping the surface continually wet ; the bruise will soon disappear.

To Stain Furniture.—A stain which is said to be good, but one I have never tried, is made by mixing with one pint of linseed oil one and one-half ounces of alkanet root and a little of rose pink. This is a stain of a very pretty reddish hue, and should be applied only to such articles as are to be stained. A little Venetian red in linseed oil makes a good cherry color. Terra de sienna in oil makes a fine oak color ; Venetian red and a very little lamp-black in oil makes a mahogany colored stain.

For dressing up mahogany, mix Indian red with copal varnish till the right color is secured ; thin with benzine, and add a little boiled linseed oil if it dries faster than is desirable. For black walnut color, mix with same pigments in such proportions as are necessary ; or take asphaltum, pulverize it, place it in a jar or bottle, pour over it about twice its bulk of turpentine or benzole, put it in a warm place and shake it from time to time. When dissolved, strain it and apply it to the wood with a cloth or stiff brush. If it should make too dark a stain, thin it with turpentine or benzole. This will dry in a few hours. If it is desired to bring out the grain still more, apply a mixture of boiled oil and turpentine ; this is better than oil alone. Put no oil with the asphaltum mixture, as it will dry very slowly.

Removing Old Varnish.—Alcohol will destroy the beauty of varnish on furniture, and may be used to good advantage when wishing to remove an old coat for the purpose of putting on a new. Fine sharp emery or sand paper may be used with good effect.

Dressing Up Furniture.—The following makes a good polish : Shellac varnish of the usual consistency, two parts ; boiled oil, one part. Shake it well before using. Apply it to the wood by putting a few drops on a cloth and rubbing briskly on the wood for a few moments. This polish works well on old varnished furniture. Another for redressing is made of cold drawn linseed oil, one quart ; gin or spirits of wine, half a pint ; butter of antimony, two ounces ;

spirits of turpentine, half a pint. This mixture requires to be well shaken before it is used. A little of it is then poured upon a rubber, which must be well applied to the surface of the furniture; several applications will be necessary for new furniture, or for such as had previously been French polished or rubbed with beeswax. Still another is made by mixing a pint of linseed oil, one-half pound of molasses and a wineglass of gin. Stir it well and put it on lightly with a linen rag, rubbing it till dry.

Furniture Filling.—Scrape four ounces of beeswax into a basin, and add as much oil of turpentine as will moisten it through. Now powder one-fourth ounce of resin, and add as much Indian red as will bring it to a deep mahogany color. When the composition is properly stirred up, it will prove an excellent filling for blemishes in mahogany and other dark furniture.

Mending Furniture.—In almost every house may be found bureaus, frames, stands, etc., where the veneering is cracked off, and but little time or expense is necessary to repair it. Where pieces are split off or out, the same should be glued in place by use of the clamp. (See "Wood Clamp," page 20.) Fit the surface of a soft wood clamp-block to conform to the surface of the piece to be glued in, so that pressure will be all alike. Heat the block hot, then put a thin coating of hot glue on the piece, place it with precision, put on the block, and clamp down firmly by use of the wedges. Let the article stand twenty-four hours before taking off the clamp.

If the break is upon the leg of a chair, or other part where severe strain comes, the use of screws may be necessary to make the repair durable. In such a case, put the piece broken off in a clamp, so as to prevent splitting, then bore gimlet holes as required, and countersink for the heads. Next, place the piece where it belongs, clamp to the main part, and bore into the other portion far enough to enable the screw to work its way; separate, apply glue, first having warmed the piece broken off, then clamp firmly and drive the screws home.

It is better, generally, if the wood is hard, to drive the screws before gluing, to see that they can be forced clear in. It is not a pleasant thing to be balked after getting everything, as it is supposed, all ready. The screws should be sunk below the surface of the article mended. Touch hot glue to the heads, and then press in putty firmly, and smooth off with a glazier's or table knife, and stain the putty to conform to the color of furniture repaired. For the preparation of glue, see "Glues and Gluing," page 178. Do not try to patch things up with mucilage, or any of the prepared materials, for they will never give satisfaction, especially where strength is required in the mended parts.

When to Repair Furniture.—Chairs, tables, lounges, etc., are continually getting out of order in every house, and the time to repair them is when the break is first noticed. If neglected, the matter grows still worse, the pieces split off, get lost, and finally results in the laying by of the article of furniture as worthless.

To Make Furniture Oil.—Take linseed oil, put it into a glazed crock with as much alkanet root as it will cover. Let it boil gently and it will become of a strong red color; when cool it will be fit for use on suitable furniture.

Effect of Water on Furniture.—Water affects no substances except such as have open pores exposed, in which case it enters and causes the substance to swell; or such as are soluble in water, as glue in joints and mucilage or gum arabic, used sometimes for attaching superficial ornaments to fancy work. The practical lesson to be learned from this is that housekeepers must take care in dealing with furniture to keep water away from everything soluble in water, oil from everything porous, alcohol from varnish and acids from marble.

To Clean Upholstered Furniture.—Occasionally upholstered work should be beaten with a flexible stick, then thoroughly brushed. It cannot be kept lively and clean by the use of the brush alone.

Wiping Off Furniture.—After the application of a moist cloth to furniture, dry it by a brisk rubbing with chamois skin; this will leave a brightness that cannot be obtained by use of a cloth.

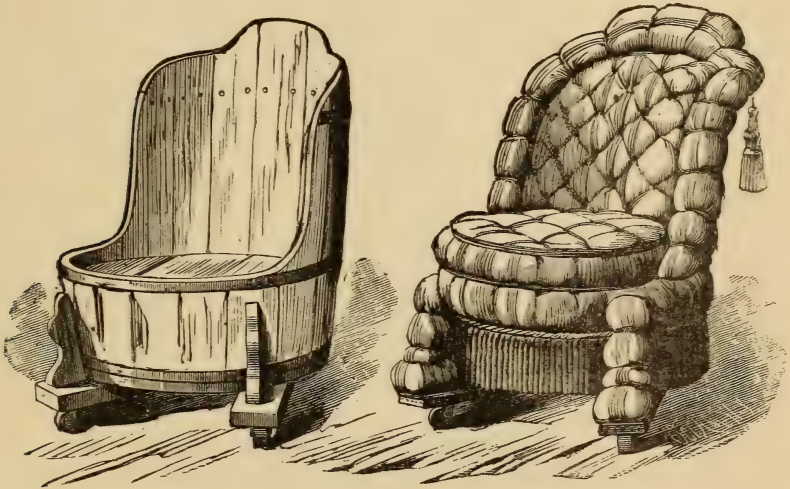


FIG. 1—BARREL PREPARED FOR COVERING.

FIG. 2—CHAIR COMPLETE FOR USE.

A Home-made Chair.—By a little mechanical aid from a man or boy, a very comfortable as well as a very ornamental chair may be made by the housewife, with but little expense for material, out of a good sized barrel. In selecting the barrel it is necessary that it be strong and well bound with iron hoops. The first move should be to mark out the shape for the chair, as shown in fig. 1, then on the part to remain, rivet the upper hoop to each stave, and fasten the

lower ones so that they will remain in place; then with a compass saw work around upon the chalk lines. By nailing a couple of cleats in the lower part of the barrel the upper head may be laid in to form the seat.

Two pieces of plank should be put beneath the bottom, which may be let in to rest upon the lower head and nailed there. These are to hold the casters, if it is desired to put them in. They will also answer for supports to a couple of pieces put up in front to add to the beauty of the chair and disguise its origin. It is not absolutely necessary to use either the planks beneath or the front pieces, if one does not feel adequate to the task. After the barrel is prepared, some coarse canvas or old stuff is tacked loosely on and stuffed with horse hair or wool, a cushion made for the seat of the same, and the whole covered with bright-colored chintz. By stuffing well and tufting, as shown in fig. 2, a chair will be produced that one will be proud of. Even if the style of covering is not imitated and made much plainer, a person will be surprised at what can be accomplished.

Renewing a Rocking Chair.—An old family rocking chair may be made very comfortable, and changed from an unsightly article by a little effort. Make a cushion for the seat out of such soft material as can be spared, then cover the back by a prepared padding or old comfortable, then cover the whole chair with cheap material, all one color, or flowered chintz. As the old style of chairs are the most comfortable possessed, it will pay to keep them in service as long as possible. If you send the chair away to have new rockers put on, give instructions to have the new made after the original pattern of the old, so that the favorite article will not appear like a stranger on its return.

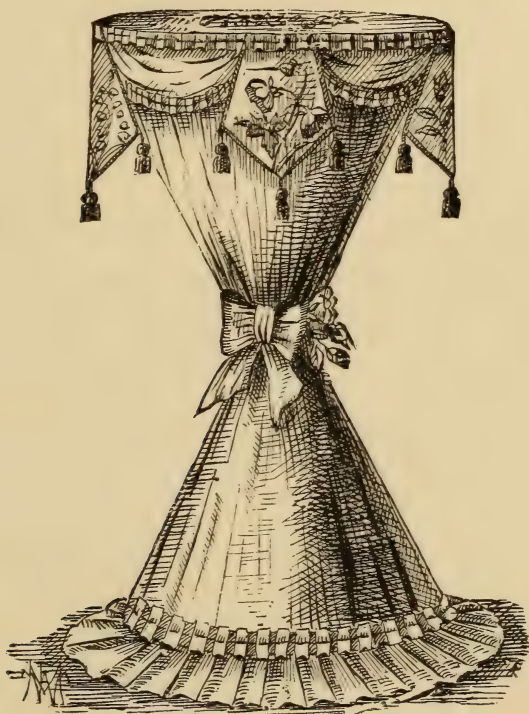
Home-made Washstand.—Select a box—a common dry goods packing box is best—about two and a half by two feet square and twenty-eight inches high. The side coming front should be open, and by means of a couple of cleats inside, a shelf put in dividing the space into two parts. Before going any further, put a common chair caster under each corner. Now put on a back eight or ten inches wide by nailing a board to the wall side of the box. The whole thing is now ready to drape.

Cover the top and back board with white or marbled oil cloth tacked on smoothly. "For the drapery and trimming," says a lady writer, "take first of blue or pink cambric, gather it a little and tack it round the top of stand, for the ground work of valance; if this be left with two openings about eighteen inches apart in front, it is best; then over this put any light material, dotted or plain, gathered or plaited. Make double box-plaited trimming of same (or similar) goods, and button at top and repeat at bottom, or leave with a plain hem (which I think is better); put also a section of the trimming on the edges where they come together in front. Place here also a bow of ribbon."

Mirror for Washstand.— "A mirror may be placed above the shelf and trimmed in same style, and rosettes of ribbon, or a splasher may be substi-

tuted, made of linen worked with red or blue embroidery cotton (it will wash and not fade) on an aquarian design, say one with a large swan, cat-tails, water lilies, cypress, ferns, and water-grasses.

Corner Stand.—"If your room is small and there is no standpoint where so large an article as a common washstand can be placed, and yet you must have some such arrangement, get a board sawed out for you, a large triangular shaped board which will fit into the corner of your room, and with a compass saw, cut a hole in the center of it large enough to hold your washbowl. Also a similar triangle—perhaps a little smaller—to fasten into the wall, a foot and a half (or even less) below it. Have cleats nailed to these boards; stain them or cover with oil cloth, and fasten strongly into the lathing of the wall. On the upper shelf, a curtain of chintz can be nailed, and a little closet for boxes or shoes prepared."



HOME-MADE TOILET TABLE.

Home-made Toilet Table.—Take a common flour barrel and weight it with a stone inside to keep it from tipping over, and then nail in the cover and place a board about three feet in length and two in width over the top of it,

fastening it firmly to the barrel with large nails. Then plait up a flounce of chintz, and fasten it around three sides of it, cutting it so long that it will touch the floor. A scalloped or pointed ruffle should then be added. A cover of the chintz could be ruffled around three sides and laid over the top, and then it can easily be removed and washed. White dimity or marseilles could be substituted for the chintz, and they would bear frequent cleansings without danger of fading. A braiding pattern would also add to its beauty, and a fringe would be a graceful adjunct.

A round table may be made as easily as the square, and in some positions is more attractive. Take two round boards, barrel heads will do, if a cleat is put across the center to hold the parts together. Bore a hole in the center of each circle and put in a stick, so as to make the circles twenty-eight inches apart, then drape as shown in the illustration. The material may be same as for square table or washstand, and the lambrequins nicely embroidered, made plain or left off altogether.

Soiled Clothes Receiver.—Take an ordinary barrel, such as is used for flower or fruit packing, and line it with tinted cambric inside and cover the outside with chintz or cretonne folded into box-plaits. The top should be finished with some sort of lambrequin. The pointed are prettiest, with small cretonne figures cut out and applied to each section. The lambrequin should be of plain brown or Turkey red. Cover the lid with the same material as the body of the barrel, and also use the same for a full plaiting around the edge. Tassels may be put on and between the points of lambrequin. For handle to lift the cover by, take a piece of stiff leather three quarters of an inch wide, and seven inches long. Cover this with the chintz or any other material you fancy, and put a screw through each end, swelling the leather up in center after the manner of a trunk handle.

To Make a Cheap and Pretty Mantel.—"A pretty mantel can be made of pine wood painted black, the lambrequin or drapery fastened to the edge with brass headed nails. Make your drapery of any plain dark cloth, have it straight and not more than five inches deep. Baste on one or more rows of velvet ribbon an inch and a half broad, and cover this with a network of coarse sewing silk in long stitches, using bright colors. Finish it with fringe. If you cannot buy fringe, make it, and this is a good way :

"Cut the material for your drapery deep enough for fringe and all, say nine inches ; then with sharp scissors cut the lower edge into strips four inches deep, and a quarter of an inch wide ; prepare two more strips four inches deep in the same way ; have them of contrasting colors ; for instance, if your drapery is garnet, have one of blue and one of yellow. Fasten these strips underneath the fringe on the drapery, then take a bright colored coarse silk and tie these three fringes into little tassels, drawing the under colors forward to give a variegated appearance."

Home-made Footstool.—Obtain a box about ten by twelve inches in size, remove projecting nails, if any, then line the inside with crimson or blue paper muslin, so that it will not be unsightly if kicked over; then cover outside after having made and put on a cushion of cheap material. Shape the cushion until it pleases the eye, and tack on about the edges. The final covering should conform in color to furniture in the room.

Red moreen or damask wear best, but the cretonne chintz is as cheap as anything, and infinitely prettier and cleaner, for it washes well. Take the piece of whatever material it may be that you intend for the top, and nail on all round with a broad furniture gimp, or fringe, and brass-headed nails. The sides are to be covered with the same material, and can either be padded or the stuff put on plain. If this is thin, it must have a cambric lining, or probably the wood of the box will show through; fasten this on by the same arrangement of gimp and brass nails as you did the top.

The footstool may be made more attractive by covering with velveteen and not using the cushion, but lay a little curled hair, fullest in center, on the top of the box. Crimson velveteen is prettiest. Put the velveteen on smoothly and tightly, and fasten with brass-headed tacks, placing them at equal distances. A tassel of wool or silk placed at each corner will improve the appearance of the ottoman, but is not absolutely necessary.

Window Seats.—Seats beneath the windows of sitting or dining rooms are a great comfort. Boards twenty inches wide, and as long as the windows are wide, are all that are required, save supports which may be improvised. Cushion the tops with whatever soft material you have, and cover to the floor with pretty chintz or woolen goods.

PICTURES AND PICTURE FRAMES.

Spatter Work Pictures.—Procure a sheet of fine uncalendered drawing paper, and arrange thereon a bouquet of pressed leaves, trailing vines, letters, or any design which it is desired to have appear in white. Fasten the articles by pins stuck into the smooth surface, which should be underneath the paper. Then slightly wet the bristles of a tooth or other brush in liquid India ink or common black writing ink, then draw them across a stick in such a manner that the bristles will be bent and then quickly released. This will cause a fine spatter of ink upon the paper.

Continue the spattering over all the leaves, pins and paper, allowing the center of the pattern to receive the most ink, the edges shading off. When done, remove the design, and the forms will be found reproduced with accuracy on the tinted ground. With a rustic wooden frame this forms a very cheap and pretty ornament.

To Preserve Drawings.—A simple device for the preservation of cards, drawings or photographs from injury by being handled or coming in contact with moisture, has been invented, and consists of a preparation of gutta percha in solution. The liquid is thrown, in a very fine spray, over the article, by an atomizer.

When the liquid has in part evaporated, which it soon does, it leaves the object coated over with a thin, translucent film, impervious to water. The gutta percha should first be purified, and it then is soluble in chloroform or ether. The process of dissolving the gum is in itself purifying. A drawing or photograph protected by this film can be washed with safety. The preparation softens at a temperature of 150° Fahr.; but to this only a rare accident would subject it.

Picture of Ferns.—Press and dry pretty ferns, then take a sheet of heavy white Bristol board twelve by fourteen inches, larger or smaller, as desired, for a background to the picture.

The ferns, with dried grasses and a few pressed flowers, can be arranged in nicely, leaving one and half inches of margin around both sides and one end. Inclose in a nice frame of walnut and gilt, and hang near the plant stand if you have one. A vine of the parlor ivy can stray to and twine around the cord that the frame is hung by, with pleasing effect.

Home-made Window Pictures.—Upon a square of white or delicately tinted Bristol board, says a lady correspondent, trace lightly some pretty designs, such as a bouquet, a cluster of leaves and fruit, or a cross or an anchor, wreathed with flowers or leaves. Those of the former selected for imitation should be simple in form.

Among the most effective are passion flowers, lilies of the valley, roses and buds, sweet peas and apple blossoms. Ivy or fern leaves are beautiful by themselves; or the former is, perhaps, prettier than anything except the passion vine, if twined about a cross. Bunches of grapes, currants or strawberries, each with a few of their own leaves attached, are very suitable.

Having traced the design, lay the Bristol board flat on a block of hard wood, and with a thin bladed and very sharp knife, proceed to cut smoothly through as much of each outline as possible without entirely detaching any leaf or other distinct portion from the whole. One-fifth of a leaf left without cutting through will generally be found sufficient.

Sometimes judicious prickings with a coarse needle add to the good effect. The points of the leaves and of the petals of the flowers should next be passed through toward the window to admit the light and give the softly shaded effect we desire. The transparency can then be hung close to a window pane by means of narrow white ribbon loops at the corners secured to the wood work.

To Fix Pencil or Crayon Drawings.—It is said this may be done cheaply, simply and without injury to the drawings by varnishing them on the

back with an alcoholic solution of white gum-lac. This solution quickly penetrates the paper, and enters even into the marks of the crayon on the other side.

The alcohol rapidly evaporates, so that in an instant all the light dust from the crayons and chalk, which resembles that on the wings of the butterfly, adheres so firmly to the paper, the drawing may be rubbed and carried about without the least particle being affected. The following are the accurate proportions of the solution : Ten parts of common gum-lac are dissolved in one hundred parts of alcohol ; the liquid is afterward bleached with animal charcoal.

Mounting and Varnishing Chromos.—Procure a piece of binders' or other strong pasteboard of exactly the size of the picture to be mounted. To this attach the chromo with any smooth paste. Do not use glue for this purpose, as it is apt to soak through the paper. Care should be taken that the picture is laid perfectly flat and that all wrinkles are smoothed out.

When nearly dry, cover the face of the chromo with a weak size made of the best white glue. Over this, when dry, lay on varnish, which must be perfectly clear and pure. Chromos thus prepared will not need to be covered with glass for preservation, but may be treated in the same manner as oil paintings.

How to Clean Chromos.—When you clean them, use a soft feather brush, or wipe them with a soft chamois skin (a drop of oil may restore clearness), or with a fine linen rag very slightly dampened. Always tenderly ! Next, whenever the original varnish coating is dulled, bruised or rubbed, revarnish it with thin mastic varnish. (See page 174.)

To Display Chromos.—Chromos, like oil paintings, should not be hung in a dark room, but in one with a diffused light, and never exposed to the direct rays of the sun. The chromos after water colors keep and display better when placed under glass, as they lack the protecting cover of the varnish. The larger chromos, after oil paintings, display, as a general rule, best when framed like original paintings. It is not *necessary* to put these under glass ; it is a matter of taste—preserving them, at the same time, from dust and rough handling.

To Clean Engravings.—To clean and whiten engravings which have become dirty by hanging in a smoky room, soak in a weak, clear solution of chloride of lime until white, and then soak in running water. Steep for half an hour in water containing a very little hyposulphite of soda to neutralize any trace of adhering bleach, and dry between blotting paper under pressure.

To Make a Medley Picture.—Prepare your foundation by tacking muslin over a frame tightly. The muslin should be a clear white. Make a dim pencil mark around where the outer margin is to be, so as to make a mechanical finish. If a common center is desired, paste around the outer edges first, till the center is reached ; if a plain view is desired, begin at top, passing in rows from left to right across the foundation ; if a square frame is used, select a picture suitable for each corner ; the upper row looks best with sky displayed.

Distance is better displayed by pasting only the lower half of the pictures; when the pictures are all pasted they will not appear in rows, as they vary so much in size; each row should lap more or less on each preceding row. Good mucilage or flour paste may be used to fasten the pictures on with. The latter is preferable if the paper is thin, as mucilage may show through.

To Clean Oil Paintings.—Oil paintings that are valuable not uncommonly become in time damaged in appearance by dust and smoke. When this is the case, and it is desired to clean them, the work should be performed with extreme care. It is said they may be renewed by dissolving a small quantity of salt in some stale urine; dip a woolen cloth in the mixture, and rub the paintings over with it till they are clean, then wash them with a sponge and clean water, dry them gradually, and rub them over with a clean cloth. Should the dirt be not easily moved by the above preparation, add a small quantity of soft soap. Be very careful not to rub the painting too hard.

Where the painting is not damaged by smoke, the foregoing preparation should not be used. In any event, try one corner of the picture first. Sometimes by rubbing the painting with the balls of the fingers, the varnish can be rubbed away in part, leaving a clean surface which may be redressed.

Cold water in some cases is all that is required to clean a painting. If this does not take hold sufficiently, add a very little alcohol or soap. Where soap is used rinse thoroughly by putting the picture under a stream of pure water, until all the soap is off.

To Restore Oil Paintings.—By lapse of time and physical and chemical changes, the paint loses in some degree its transparency and the picture fades, those colors containing the least of oil changing the most. Pettenkofer has discovered that the vapor of alcohol will renew the qualities, and he restores old oil paintings by placing them over a tight box, in the bottom of which is a flannel cloth, which has been dampened with alcohol of eighty per cent. strength. The arrangement should be such that every part of the picture will be exposed to the alcoholic vapor.

To Transfer Steel Engravings.—Take glass that is perfectly clear (window glass will answer), clean it thoroughly, then varnish it on one side only, taking care to have it perfectly smooth, place it where it will be entirely free from dust, let it remain overnight, then take your engraving, place it in clear water until it is wet through, say ten or fifteen minutes, then lay it upon a newspaper that the moisture may dry from the surface and still keep the other side damp.

Immediately varnish your glass the second time and place your engraving on it, taking care to lay it on straight, press it down firmly so as to exclude every particle of air, then rub the paper from the back carefully until it is of uniform thickness, so thin that you can see through it; varnish the third time and let it dry in a room of moderate temperature.

Transferring Pencil Drawings.—Any kind of reasonably fine paper, either thick or thin, serves to receive the copy. Simply lay it upon the drawing board, then upon the face of the drawing paper lay the transfer paper, and upon the top of the lot lay the drawing, pencil marks upward, fasten the whole three sheets together and to the board by four drawing pins, one at each corner, then proceed to run over the pencil marks with a fine but dull pointed instrument. Use for the purpose a stocking darning needle with a handle, and the point ground off; and run over the marks same way as with a transparent slate.

If the drawing is not too thick and the carbon paper is good, a good copy may be obtained with care and practice. Copies are also taken by first perforating the picture with small holes along the marked lines with a needle, then afterward laying it on the face of another sheet of paper, and rubbing it over with powdered black lead; the black lead goes through the holes and leaves a dotted outline beneath. A pencil is afterward run over the marks and a fair copy is produced, which can be quickly multiplied.

Photo-Enamel Work.—The first step to be taken in preparing the picture is to soak it off the card, if mounted, and care should be taken that it gets perfectly dry before putting on glass. Make a paste, using about fourteen teaspoonfuls of water to one of starch, boil until perfectly transparent, spread on both picture and glass, take two thicknesses of good wrapping paper and put on the back of the picture, changing as soon as the paper becomes sticky; work out the paste carefully and thoroughly from the center of the picture, let it get perfectly dry, and then fill it with castor oil.

Let it remain until perfectly transparent, pour off the oil, and dry with a soft sponge, being very careful not to injure the picture. It is now ready to paint. Paint the eyes and jewelry on the photograph side with water colors. Cover this with another glass and paint with oil colors all other parts, having put small pieces of cardboard on all sides of the second glass to keep them separate.

Use the colored paper for back that will harmonize best with the picture. There are several ways that the work can be done quicker, but none, I think, superior to this, if directions are followed closely. Use the paints right from the tubes.

Perforated Cardboard Frame.—Cut from your perforated paper two side pieces and two end pieces of the length and width you wish your frame to be; allowing for projecting corners, as they are much prettier than plain. Notch the ends, lay them in the proper form, and tack slightly at the crossing-places with fine thread.

Then cut four more pieces, one row of perforations smaller all around; lay these upon, and exactly in the middle of the others and tack as before. Continue this, making each layer smaller by one row of holes all around, until a width of only two or three rows is obtained. The last layer, perhaps the last two, are better gummed on than sewed. Some use gum water altogether.

These frames are strong enough to support a light glass—fitting it neatly in at the back—if a glass is desired. After the picture is in place, paste strong paper over the whole back, which will give it firmness. A fancy button or other ornament sewed on at the corners will make a neat finish to the frame.

These frames may be made varying from one inch to an inch and a half in width, according to the size of the picture and the strength required. Colored paper is preferable to white, when it can be procured. Wood color is very pretty, also various shades of brown. Green and straw color look well for landscapes.

Rose Leaf Picture Frames.—The leaves of the multiflora or climbing rose are best suited for this purpose, as they have a greater richness and variety of color than most of the rose family. At the time that there is the greatest variety of colored leaves, strip them from the bush and put them to press in any old book you do not wish to use; change them as often as every other day until sufficiently dried.

Take any picture you wish—an engraving is generally used—very pretty, though small ones, may be found in magazines, ladies' books, etc., larger ones are usually purchased at bookstores—tack on to a pasteboard which will leave a margin the width you wish for your rose leaf frame, outside the engraving. Fasten the leaves on to the pasteboard frame either in knots or groups, or singly, overlapping each other, and varnish. When dry, suspend with cord and tassels, and you have a very pretty picture.

Use for Old Frames.—Old picture frames that have become defaced, may be used as the foundation for shell frames. Scrape off the old varnish as much as possible, and then take shells, small nuts, beans, cones, pebbles, seeds, pits of fruit, etc., and arrange them upon the frame to suit the taste. The largest cones or nuts look best at the corners and in the middle of the sides. Fasten them on with strong glue, and when firmly set give all a coat of varnish.

Composition Ornaments for Frames.—Mix whiting with thin glue to the consistence of putty. Have the mold ready; rub it over with sweet oil and press the composition into it. When a good impression is produced, take it out and lay it aside to dry. If it be desired to fit the ornament to a curved or irregular surface, apply glue and bend it to the place where it is to be attached before it gets dry.

Trimming Pictures with Vines.—By placing a wedge-shaped can, filled with good soil, behind a picture, English ivy may be grown vigorously, and while the rootings are out of sight, the vines may be made to twine at will. The effect will be most gratifying. If the picture is so located that the can may be seen at a certain part of the room, it may be painted or papered so as to be ornamental of itself.

Fastening Shells to Frames.—Where shells are to be put on a box or frame close together, glue may be used, but where they are not so close to-

gether but that the base can be seen between them, a cement made of white paint or putty should be employed.

Take whiting and oil or putty as bought at the store, and a little chrome green; mix and pound it with a hammer until there are no streaks of green or white in it; have it just thick enough so it will not run; then spread it smoothly over one side of the frame a little less than one-eighth of an inch thick: put on the things, and then spread putty on another side. When the frame is dry, varnish it, and when it is thoroughly dry it will be as solid as any one could desire.

Repairing Gilded Frames.—Very often gilded picture frames become damaged either by bruises or the plating cleaving off from the plaster foundation, which makes them unsightly. Now, if taken to a picture store, you will be told that there is no remedy, as they cannot be repaired, so don't take them.

Buy a small paper of bronzing or gilding dust, and, after applying a little varnish to the damaged part of the frame, dust on a little of the gilding material through a cloth and let it dry. It, of course, will not make the frame as good as new, but the white, unsightly place will be covered up and not be detected unless closely examined.

There is a gilding powder which comes in a small bottle, with a second phial of liquid for wetting, which is far superior to the first mentioned. It is called "gold paint," and is certainly a very excellent thing for fresh gilding or repairing damaged articles that have been gilded. I have used many bottles of it.

Corn Husk Picture Frames.—Take a piece of cardboard large enough to leave from four to five inches margin after cutting a square place in center large enough to expose the picture to be framed.

Next, take fine white husks—not those thin, like tissue paper—cut into strips half or three quarters of an inch wide, according to the size of the picture, make them three inches long, then double over, forming a loop, and bring the ends together. Fasten two rows of these loops clear around the edge of the opening in the cardboard. Begin sewing on at upper left hand corner, cross the top and down the right side, then begin at upper left hand again and go down and cross the bottom, either lapping over at the crossings, or cutting off closely, so that there will be a good match.

In putting on the loops, of course, one is laid overlapping the other, shingle fashion, just so that the loops touch each other. After these two rows have been completed, cut some more husks full width and three inches long; double into loops as first, then slit them fine with a needle and sew on a double row the other way, *i. e.*, across the frame at right angles with the first, the fine loops overlapping the others a little.

Now put on two rows around the outside upon the ends of the shredded ones, in same order as the first. These also should be split up fine with the needle and cut of uniform width. As the middle rows run sidewise around the frame instead of endwise they can be put on full or any width.

Trim edge smooth, cutting cardboard up close to husks, then take a thin piece of board and make a frame. Place your glass and picture between your paper frame and your board frame, and tack or paste your paper frame down smoothly. You will thus have a very pretty rustic frame. Reject stained husks.

To Make Picture Nails Hold.—Sometimes a good deal of trouble is experienced in getting nails to hold in a plastered wall just where they should be to allow the pictures to hang at a given point, or exactly between two casings. If neither nail or screw can be driven to hold, make the hole by use of a gimlet larger than is required for the nail; then fill the hole with plaster of Paris wet with salt water, and insert a screw by turning it carefully in; then finish the job with a pocket knife blade, forcing in as much plaster as possible, but do the work rapidly, as the plaster will set quickly and hold firmly.

The Arrangement of Pictures.—It is often impossible, in small parlors and sitting rooms, to give each picture precisely the light which would show it to best advantage, therefore a careful distinction should be made. It is seldom well to hang a somber picture in a broad light, or a cheerful, sunny one in a shaded corner. A moonlit landscape or a night storm at sea, are better placed in a mild light, while a group of laughing children, or a harvest scene, seem naturally to require a strong one.

If there is one picture considerably larger than the others, it should have the widest vacant space on the wall, provided the space is at all suitable for it. Companion pictures should be near together or—which often has a better effect—placed each side of a window. The space between two windows, if not occupied by a mirror, is very nice for a gilt frame picture of good size; dark frames look better in a more subdued light.

Grouping Pictures.—In grouping, regard should be had to the size, shape and color of frames, and to the subject of the pictures. Oval forms are preferable to square for grouping, though the rustic or “log cabin” frames, with projecting corners, hung in triangle or diamond forms, often look extremely well.

Three pictures of the same general appearance, hung in a horizontal row—about half the width of the picture is considered a proper distance between them—with two smaller above, and the same below, matching the spaces, and making seven in all, are a very convenient and common form. Or if the central piece is larger than the others, the effect is equally good.

Two ovals, one above the other, with a smaller rustic or square frame each side, matching the vacant space, look very well; or *vice versa*, the ovals outside. Many arrange pictures to represent crosses, but care should be taken not to overdo the cruciform style. I have seen parlors in which this symbol was so often and so incongruously introduced that it seemed shorn of its best significance.

It is well, when convenient, that those pictures which correspond in position

should be nearly uniform in size and in general aspect. But this is not all important, and considerable variety may be made very pleasing, especially if the cluster be composed of quite small pictures, like card photographs in tasteful frames.

Do not allow too much incongruity in the expression of the group. If one arm of your cross, or one point of your diamond is a Madonna or a crucifixion, do not let the corresponding one be a Bacchus crowned with vine leaves, or a jolly washerwoman! A rural landscape accommodates itself to almost any place; so does an infantile face or a garland of flowers.

Lights for Pictures.—When it is practicable, avoid cross lights, and if in your picture the sun is represented as shining from the left, try to arrange it so that the light from your window will humor the delusion.

To Make Glass Transparencies.—Mrs. Caroline S. Jones, who has written much concerning domestic arts, has furnished the author with the following very excellent directions for making glass transparencies, such as shades for lamps, panels for outside doors and window panes (desired obscure), besides lanterns for halls, vestibules, and other positions, in this style, which are extremely chaste and effective.

Imitation of Carved Marble Glass Transparency.—The best designs for this work are the statuary figures photographed or engraved. Take the picture and place upon it the ground glass, cut in proper shape and thoroughly cleansed; then sketch off the design with great care (if ground glass cannot be procured readily, varnish plain glass with dammar, using it rather thin and applying smoothly; when dry until merely sticky, place very sheer swiss, or fine, close-meshed bobbinet over it, rolling perfectly smooth, and until it unites with the varnish in every part).

Having sketched in the manner described, or by pricking the outlines on paper, placing this on the glass (rough side), dust lightly with a pumice bag, using fine black powder of some kind, then lifting the paper, the design will remain in minute dots, which may be readily drawn out.

Next proceed to shade with drawing pencils Nos. BB, B, F, HB and H, using a buckskin "stump" or the stub ends of old camel's hair brushes. Rub down and soften all rough outlines, blending and mellowing the shades until the true effect is obtained of the carved marble statue.

This must be carefully done, following the lights and shades suggested by the photograph or engraving. The high lights and deep, dark shadows are to be touched up last, the former with mastic varnish, the heavy strokes with black crayon, shaded and "stumped" until the desired effect is produced.

When the figure is thus satisfactorily finished, the entire ground must be filled in with opaque black, made by rubbing up lamp-black with copal varnish, or tube paint will answer, if more convenient.

Clear glass may be used if the design, after being outlined, is painted over

with two coats of dammar (antique) varnish. The work is made very much finer by constant applications of the pencils, touching and retouching, "stumping," and shading repeatedly, until no sharp lines mar the softness. These transparencies are exquisitely lovely, the statuary appearing to stand out in bold relief with soft, white, statuesque beauty against the deep black background.

Where it is desirable to have colored transparencies, the ground may be laid with any transparent color, Prussian blue, any of the lakes, mixed with dammar varnish, as crimson, lake and Prussian blue for a rich purple, vivid emerald green from yellow lake and Prussian blue, etc.

Glass Transparencies with Engravings.—Have the glass perfectly clean, and apply a coat of antique varnish, dry and give a second coat. When these are dry apply a third coat, and when dry until sticky, it is ready for the engraving. This should be laid between the folds of a damp towel until thoroughly moist, sprinkling a little salt in the water. Then place it (face down) on the varnished side of the glass, and with a pad pat and press every part of it until all air bubbles are expressed, and there is full assurance that each part adheres closely to the glass.

When the whole engraving has been firmly fixed, moisten the finger in clear water and commence rubbing off the white paper from the wrong side, rolling off the minute pellets as they form beneath the finger; as the engraving is approached great care will be required, in order not to disturb the mere film of ink, which if destroyed would mar the engraving. Dry thoroughly, and if any white spots or dim places appear, again dampen the finger and remove them.

The picture should appear quite perfect when the clear glass is placed upon a solid ground for the purpose of rectifying any blemishes. Then if colored designs are desired, take transparent paints and tint according to the shades of the engraving, which any mere tyro in the art may readily accomplish, and when dry put on the ground, then again dry and apply white antique (dammar) varnish. These transparencies are lovely beyond description.

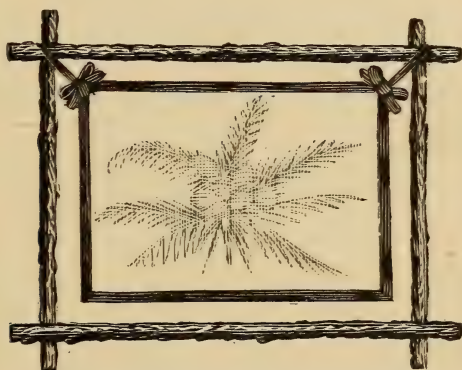
To Make a Passe-Partout.—A passe-partout should only be made small, say ten by twelve or twelve by fourteen inches. One light of glass, a piece of cardboard size of glass, the picture to be framed, which should be an engraving or water colored painting, a few strips cotton cloth an inch and a half wide, two pieces of tape two inches long, and a yard or two of fancy paper an inch wide, are the materials required. A piece of old pasteboard box will answer well enough for cardboard.

On the back of the pasteboard sew the two pieces of tape, forming loops—use rings in them if you choose—have them one on each side near the edge, and about one-third the height from the top of the picture. Then put the glass over the picture, the pasteboard behind it, and holding the edges firmly together, paste over them the strip of cloth to hold them firmly together. Do not allow the cloth to reach over the edge of the glass more than a quarter of an inch.

Set the picture away until dry, then put on the binding paper, which should be either red, stone or gold color to look best. When putting on these edges join as neatly as possible at the corners, allowing the paper to project over and upon the surface of the glass three-eighths of an inch, or enough to cover the thin cloth.

Frame for Pressed Ferns and Flowers.—Select feverfew that has not been in bloom more than a day or two, and pansies that are large and perfect; also ferns that are not specked or broken. Make a rustic frame by crossing, as illustrated, four sticks. The frame should be twelve by fourteen inches or larger, according to the size of glass used, and fastened by small nails at the corners.

After your flowers are pressed perfectly dry and frame ready, take a pane of glass, wipe it clean and dry, then have some gum arabic dissolved and a small camel's hair brush. Brush the back of each flower, fern or pansy thoroughly with the gum arabic before placing it on the glass, which should be laid on a table.



RUSTIC FRAME, OR FERN CASE.

Arrange the flowers on the glass in a bouquet in the center, pressing each one carefully down with a small linen cloth. Around the edge, two inches in toward center, make a narrow border of detached pieces of fern if you like.

The glass should be an inch smaller, at least, than the frame. After the bouquet and border is arranged, and has stood a half day, varnish the flowers and borders with white dammar varnish. When this is dry, put another pane of glass of same size over the first and bind the edges with narrow ribbon. Hang them in the frame with a bow of ribbon, tied and then sewed from the corners of the glass to the corners of the frame. This makes an elegant parlor or library ornament. The frame may be set on a table with brace or against the wall or be supported by a standard.

Eastlake Picture Hanging.—One form of Eastlake picture hanging is suspending the frame by velvet straps at each upper corner. Cut strips of canvas one inch wide and cover with velvet or velveteen. Wine color I prefer. Put curtain rings in one end to go on to nails or hooks on the wall. The lower ends are simply tacked to back of frame. Straps go straight up.

Height of Hanging Pictures.—Pictures should never be hung so high as to make looking at them a pain to the neck, as was the custom at one time. New houses are quite commonly built of late with a rod stretched along the wall close to the ceiling, from which pictures may be suspended, and on which they may be slipped to any point desired. A few nice picture nails, however, do not deform a wall, and often two or more pictures may be hung from one.

Proportion in Margins in Pictures.—A cabinet maker gives the following rules for comparative space between the subject and frame: First, find a harmonic third to the length and breadth of the print and take it for the collective widths of the margin and frame. Second, divide this space harmonically, so that the whole space and the greater and smaller parts of it are three successive harmonic terms, and you have then taken the less part for the margin and the greater part for the frame.

In my opinion, the eye should be more of a guide than mathematics in finding the proper widths of margins in pictures and frames. Oil paintings and chromos have no margins, and these should have deep frames of gilt or gold. Steel engravings look well with flat, dark frames, as they have white margins. A small oil painting requires a proportionately deeper frame than a large one.

Appropriateness of Pictures.—Some one, I know not who, has very wisely said, that "pictures are always beautiful when they represent pleasant ideas, so we never fancied a battle scene on a parlor wall. We cannot see the propriety of ornamenting a sleeping room with a murder scene, and a sick chamber with the cut of somebody's 'tomb,' or a floral cross taken from a coffin. Cemeteries are a necessary evil, under the present constitution of things, but we like to have them kept in their places.

"It is not always quieting to a sick man's nerves to see the jaws of death open to receive him. Give us a grand landscape for the parlor—a landscape that will thrill you with happiness and inspire you with noble motives every time you see it. In your sleeping room hang the lovely face of a tired child that has dropped off to dreamland among the roses.

"Give to the sick ones a peep into a sunlit vale, with only shadows enough to make it look like rest and peace, and let them see a clear, still lake, with a green and quiet shore. But these 'masterpieces' of death agonies—where shall we put them? Surely not in our happy homes, not among our flowers and little children."

CHEAP WINDOW CURTAINS.

Scrap Silk Curtains.—A very effective and unique heavy curtain is made in the following manner: Make a collection of all colors and kinds of old silk and satin which is not soiled, and the more new scraps the better. Cut or tear into strips, say half an inch wide; sew these together and wind into a ball exactly as rags are prepared for a carpet. When a sufficient quantity by weight is thus prepared, take it to a carpet weaver and have it woven the width you desire the curtain, in the same manner a rag carpet is made, the weaver using silk instead of cotton warp.

If the warp is all of one shade, garnet, gold, or blue as preferred, it will produce the best effect. Individual taste may be exercised in arranging the colors of the silk strips, but they should be promiscuously mingled. Avoid set stripes of red or blue of any width at all. If two or three strands simply, of gold color, a foot apart when woven, can be obtained, the result is pleasing.

When the weaver returns your scraps woven into the desired length for curtain or portière, finish the front and bottom edge with a band of plush or velvet of a bright shade, and when hung loop with the gilded chains.

Muslin Curtains.—No one who has not used unbleached muslin, or cloth of open texture, called cheese capping, can realize how rich and becoming such curtains, if properly made, are to a room. Put up either with cornice, pole and rings, or even fastened to the upper casing of the window and doubled over at the top in plaits, forming a sort of lambrequin, they are nice. For trimming at the lower part use three bars of colored flannel, and at the top beneath the cornice or pole three more, each one edged with a feather-stitch embroidery in worsted silk. The curtains should be long enough to touch the floor when looped.

Trimming Muslin Curtains.—The flannel for trimming unbleached muslin curtains to be most effective should be crimson, navy blue, or yellow. They may contain them all, one stripe of each. *Harper's Bazar* gives some very good instructions upon the art of trimming, etc., which I annex: "Cut the flannel lengthwise to avoid seams, making bars of either one-eighth or one-quarter in width, according to fancy. Baste them across the curtain about half a yard above the hem, leaving a small distance between each.

"A half or quarter of a yard below the cornice put the same, with equal distances between. Finish the edges with a row of feather-stitch or any such embroidery in worsted. Black, yellow, crimson, and deep green, with a little pale salmon, are good colors to use, but of course individual fancy may be exercised. In case lining is desired, a cheaper quality of unbleached muslin or a colored Canton flannel may be used.

"When the side pieces of the curtain are finished, take a strip two yards long and about one yard in depth, and trim with narrow bands of the flannel to

match the sides. This must be plaited on the center of the cornice *first*, or hung on the pole if one is used; then plait on the side pieces, and do not loop them back unless such an effect be specially suited to the window. Curtains of this description may be made for about \$2.50 a window. The navy blue flannels are twenty-five to forty cents a yard; the higher colors forty to fifty.

"Curtains quite as pretty, though less brilliant in effect, may be made in a simpler way. Use the unbleached muslin, trimming in bands, similar to the flannel ones described, with colored Canton flannels, which are to be found in rich shades of crimson, blue and brown for fifteen cents a yard. Either the right or wrong side may be used effectively, a feather-stitch border of black and yellow being the best finish. With these it is better to have a border about a quarter of a yard in depth across the bottom of the curtains of the flannel.

Fringe and Chintz Curtain Trimmings.—"A good effect is obtained by putting blue or crimson worsted fringe across the upper bands. Fringe in this way is very much used in the best upholsteries. Still other modes of trimming the muslin curtains are with chintzes and cretonnes. The pretty glaze chintz which you can find for twenty cents a yard, in band patterns, straight garlands of roses, and the like, is extremely effective put on in strips, the width of the chintz making three or four bands, so that seven yards of the chintz and eight of the muslin will furnish one window. The cretonnes also trim effectively in a border cut out and worked in button-hole stitch, if you like, or simply put on as border, with a frill of the cretonne muslin fluted by a machine.

Damask Curtains.—"Curtains more elaborate than muslin may be made of gray table damask. Divide the width for each window, put a hem border of either the Canton flannel, Turkey red, or the red and white table damask, which trims very prettily; then embroider a wide band across the lower part of the curtain, one at the upper, and edge these with stripes of velvet or velveteen. These curtains may be manufactured at home. The embroidery is, of course, in worsted, exactly like that used in the tidies. Manila cloth or burlaps is very pretty, the latter worked in worsted.

"For any worker who has time to devote to such graceful employments, beautiful curtain borders, and very inexpensive ones, may be made of worsted flowers, such as pansies, marguerites and other flat-petaled blossoms. These would border the unbleached muslin most effectively, with or without a finish of black velvet.

Canton Flannel Curtains.—"Very pretty curtains may be made of Canton flannel, ornamented with cretonne figures, which, being carefully chosen and cut out, should be artistically grouped, and glued on the flannel, and then pressed with a warm flat-iron. The effect is novel. In preparing these window hangings one result will suggest another. Already innumerable ways and means are found by those interested in the cheaper form of household decorations."

Poles for Curtains.—"Cornices are not so much used as poles, and to obtain the latter get a carpenter to cut you simple poles of black walnut or stained pine. It is easy to find brass tops, which you can insert yourself, and put on the curtains either on rings or by running them over the poles. A very little practice and experience suggest many economies of the sort, which only need some one's trial for a precedent.

Colors for Curtains.—"A *touch* of yellow with either blue or green has an excellent effect. Crimson always furnishes a large window better than a small one, and pale blue or pink requires a very dainty taste and surroundings which are in every way artistic. It is impossible to be reckless with these neutral tones or they vulgarize the rest of the apartment.

"We can give color and effect in any room with other tints, regardless of minor surroundings, but a bed room hung in any delicate shade demands a certain perfection, from the tint of the wall to the plates or vases on the chiffoniers, or frames upon the obscurest pictures in the room."

MAKING AND CLEANING CARPETS.

The Rag Carpet.—As much good taste can be displayed in making a rag carpet as in any other article of domestic manufacture, and no one need be ashamed of a good one; yet I believe there is no home-made article where such a lack of artistic skill is shown as in this. The rags may be cut well, and nicely colored, but the arrangement is too often left to the weaver, who will plan the stripe to suit her own taste, or so as to be most convenient for weaving. It is better to plan your own stripe, or get some one to help you whom you know has better taste than yourself.

Stripes in a Rag Carpet.—Wind the stripe that you wish copied upon a strip of board, and make your rags of different color to correspond in pounds with the different shades put into the stripe.

Preparing Rags for a Carpet.—Cotton rags should be cut wider than woolen, so that they will show the same size when beaten up, and make the texture uniform; this can be easily managed by pressing a strip of each kind between the fingers. Never wind two colors in one ball, for it will perplex the weaver, and ten chances to one be the means of injuring the beauty of your carpet.

The most convenient way for cutting rags, if one has a sewing machine, is to take breadths of the same kind and color, lap the ends half an inch or more and sew twice across; then tear strips the whole length, cutting across the seams of course, and there will be but little work left for the needle.

If a smooth carpet is wanted, most of the rags must be cotton, and the other rags made of fine woolen cloth. Coarse threaded woolen rags make a carpet look rough, and though it may do well for a kitchen, it is not nice for a dining room. Unless the rags are light, it will take a pound and a half, and sometimes more, for each yard of carpet.

To know when sufficient rags are prepared for the number of yards wanted, the prepared rags must be weighed. If the rags are light, it will not take quite a pound and a half; but if they are coarse threaded or woolen rags, it will take some more than a pound and a half, if the carpet is well beaten up.

For a hap-hazard carpet, all different colors may be mixed in sewing. This will use up all short rags, or any color or shade, and often makes a very pretty carpet, which may be woven easier and cheaper than a striped carpet. Short pieces, or those not more than three or four yards long, alternated with shorter ones, look the best in this kind of carpet. Any light mixed or plaided woolens may be improved in color by dipping in a good red dye. Clean white rags can be colored yellow, orange, blue or green. Dingy white rags will look well colored hemlock color and set with lime.

Warp for a Rag Carpet.—As to warp, all kinds are used, some preferring to buy cotton yarn and double it; others get the prepared, which is by far the cheapest, if a woman values her time anything. The warp is usually considered best when given either a permanent dark or nankeen color, and it certainly looks better than white after the carpet has been used a while. It may be reeled in skeins of five knots before coloring, allowing one skein to a yard and about three knots over, to be woven in at the end of each breadth, for binding.

How to Make the Breadths.—Measure the inside of the room and let the weaver know how long to make each breadth. Carpets will shrink a little in length from the weaver's measure after they come out of the loom, but will often stretch a little in width. The stripes will match the best, if the edges on the same side of the loom are sewed together, as the different sides of the loom sometimes vary a little.

To Clean a Rag Carpet.—Take some clean warm water in a pail, and a clean white cotton or woolen cloth—that you may the better see the progress you make—wring out the water every time as dry as you can—proceed to rub your carpet with it. If very dirty, a scrub brush and soap may be used. You can do so without wetting your carpet through. It must not be wet at all, only damp. Shut up doors, open windows; a day will dry it.

How to Mop a Carpet.—Take a clean mop, made of woolen cloth is the best, make a little clean warm soap-suds with hard soap, dip in the mop and ring half dry, then rub the carpet hard. It will take up the dirt and make an old carpet look much better, and will not soil the best. After mopping, rinse with clear warm water, using but little, and then wipe with clean, dry mop.

The best carpet may be mopped in this way, and if dirty greatly improved in

appearance—in truth, made to look as well as new. If there is much green in the carpet, put alum in the rinsing water; it will prevent fading, and make the color look brighter.

To Renew Colors in a Carpet.—A teaspoonful of ammonia in one gallon of warm water will often restore the color of carpets, even if damaged by acid or alkali. If a ceiling has been whitewashed with carpet down and a few drops are visible, this will remove them. Or, after the carpet is well beaten and brushed, scour with ox gall, which will not only extract grease, but freshen the colors.

Put half of a fresh gall in a pail of warm suds and apply with a clean scrubbing brush; follow with the other half of gall in a pail of pure warm water; apply with a flannel cloth—old underwear is good—and wipe with dry flannel. This will make old Brussels carpet look like new. Do not saturate the carpet.

Care of Stair Carpets.—Where stair paddings are not used, nail some old carpeting on several thicknesses of canvas over the edges of the stairs before putting down the carpet. If the material mentioned is not at hand, use folded pieces of newspaper. It is a good plan to buy more carpet than is needed to cover the stairs, and move it several times each season if much used, so that the whole will wear evenly; if stair carpets cannot be changed in this way they will not last long.

Stair carpets should never be swept with a common floor broom; it is ruinous to their good looks and soon wears them out. A small dusting broom should be used, taking care not to brush across the warp. After a thorough dusting a damp cloth may often be used to good advantage.

To Remove Tar from Carpets.—A very good material for removing tar is butter. Tar is soluble in fat, and especially in butter; when this is left on the tar spot for some time, both butter and tar are easily washed out by a sponge, with soap and water. It is the same with resinous wagon grease.

To Take Grease Out of Carpets.—Cover the grease spot with whiting, and let it remain until it becomes saturated with the grease; then scrape it off and cover it with another coat of whiting, and if this does not remove the grease repeat the application. Three coats of whiting will in most cases remove the grease, when it should be brushed off with a clothes brush.

If the whiting is not at hand put on plenty of flour and do it as soon as possible. Put flour on the floor under the oil spot. Next day brush up all the flour from the carpet and floor with a stiff brush, and put on fresh flour. It will seldom need it a third time.

Another Method.—Take the yolk of an egg entirely free from the white; mix it with a little warm water (be sure not to scald the egg), and with a soft brush apply the mixture, and rub it on the spot until the grease appears removed or loose. Wash off the egg with moderately warm water, and finally rinse off the whole with clean cold water. Should not all the grease be removed,

which may arise from not being sufficiently washed, dry and repeat the operation.

Still Another Method.—To take out small grease spots, a very good way is to rub them with white flannel dipped in spirits of turpentine. If they show again, repeat the process. Ammonia water is also good, but the dry process is preferable, as washing out is liable to injure adjacent parts.

Moths in Carpets.—Camphor will not stop the ravages of moths in carpets after they have commenced eating. Then they pay no regard to the presence of camphor, cedar or tobacco. A good way to kill them is to take a coarse crash towel and wring it out of clean water. Spread it smoothly on the carpet, then iron it dry with a good hot iron, repeating the operation on all suspected places and those least used. It does not injure the pile or color of the carpet in the least; it is not necessary to press hard, heat and steam being the agents, and they do the work effectually on worms and eggs. The camphor will doubtless prevent future depredations of the miller.

Taking Up Carpets.—A lady writer thinks carpets ought to be taken up in summer and kept up until fall. She asks, why should we not more generally imitate continental custom by painting or polishing our floors? Floors, painted or polished, look far prettier in July sunshine than any carpets, which are then mere fusty traps to catch dust, harbor insects and retain bad smells. Everything has its use and its seasons. Where it is impossible to paint or polish the floors of a house, the employment of matting will be good economy in summer, and far cleaner. Matting, too, of charming patterns, may now be bought very cheaply, and it keeps a room delightfully cool and fresh.

How to Sweep a Carpet.—Almost invariably carpets are swept by too much pressure upon the broom. Sometimes the operator, with the handle inclined backward toward her, presses down as a forward thrust is given, and thus throws the heavier dirt half way across the room, while the light particles are sent whirling about, covering, as it settles, every article of furniture. Another wrong way to sweep a carpet is to move the broom forward with a heavy, drawing stroke, by which the material to be removed is pressed into the carpet rather than worked gently along on the surface.

The right way to sweep is to incline the handle a little forward, then give a light drawing stroke, allowing the broom to scarcely touch the carpet. Not one half the weight of the broom should be allowed to press on the carpet, as the dirt is moved forward. Let the dirt be moved and rolled along lightly.

If a generous quantity of tea grounds or small bits of wet paper can be spread over the carpet before the sweeping is commenced, all the fine dirt will adhere to the wet materials. The broom should be a good one, having a long elastic brush, then by touching the carpet lightly it will scarce require the strength of a child to sweep a large parlor in a few minutes, and the work will be done in a most satisfactory manner.

HOME-MADE RUSTIC WORK.

Material for Rustic Work.—The lady who has never attempted to manufacture any rustic articles cannot appreciate her own ability, and will be surprised, after one attempt, to see what she is able to do. In the rural districts one is in the midst of the very finest of material for home ornamentation, and it may be found in any place where trees and vines are permitted to grow.

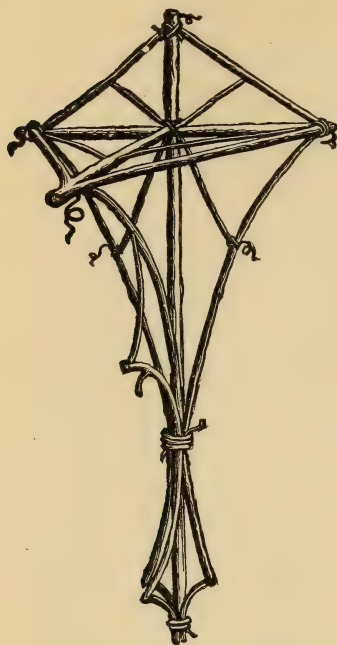
The twigs and limbs of the spruce, oak, hickory, willow, chestnut, cedar and other trees make excellent material, especially the first, and the grape vine, either wild or tame, affords another rich source. Then, again, the mossy bark of oak, or birch, which may be obtained at any saw mill in regions where these trees grow, works handsomely. Lichens and mosses come in and play an important part, sometimes, especially in brackets and baskets. Branchlets of yew are of such form that they may readily be made into "rustic letters," which, if well frosted and placed on a crimson or other vivid ground, are capable of wonderfully unique effects.

Butternut Bracket.—It is not an easy task to make a bracket of butternuts, but it is very pretty when finished. Get a boy to saw up some of the nuts into slices an eighth of an inch thick. You will need forty or fifty pieces. Obtain a plain wood bracket of pretty shape, and placing this upon a sheet of paper, mark all of its outlines, the back, the shelf and its support, in separate places; pick out all the meat from the butternut slices, also the outer husk, if any remains upon the shell; with a stiff nail brush remove all sawdust, or other substances; prepare some liquid glue, and proceed to fit the shells together, gluing them by the edges, to form the penciled shapes, not upon the wood bracket, butt the edges of the pieces together, to form the shape outlined upon the paper. Provide yourself with an immense stock of patience; it is slow work, as you must hold them in place upon a flat surface until the glue is partially cooled.

When this work is done, secure thin, light strips of wood, glue one strip down the middle of the back, two side pieces across the arms, upon which the shelf will be attached. This frame would be greatly improved if cut out whole, in the form of a slender cross. Glue one strip under the shelf next the bracket; finish it with a light coating of oil or varnish.

Rustic Vase Stand.—For a stem or standard to the vase, select a pronged sapling, the more crooked, gnarled and twisted the better, provided the stem below is straight. Gauge the length of the standard according to the height desired for the vase, and cut the prongs so that they will rest firmly on the ground as feet, leaving the stem perfectly erect; peel off all the bark,

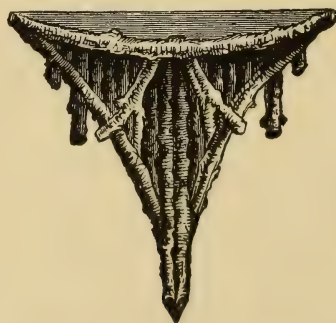
Rustic Brackets.—Very ornamental brackets may be made from twigs and vines alone, or from sticks and a bit of board. To make one of the grape vine, use green material and put together after the style of the illustration. First make a cross of the grape vines, the horizontal piece crossing the upright half its length from the top. That is, if the cross piece is eight inches long, cross the upright four inches from the top. The length should be double the width.



RUSTIC GRAPE VINE BRACKET.

For the shelf, a three pronged stick is necessary, one part going to the center and the two outer prongs to the ends of cross piece. The other sticks can be added as represented, or a style invented. A few grape vine curls left at certain points will add to the rustic appearance. The fastenings should be of flexible twigs.

The bracket of sticks and board can be made to look very pretty by carrying out the design illustrated. This style should not be more than six or eight inches wide, and not more than one-third deeper than the width. The front of the platform is supported by two braces, as represented. The sticks should be fastened by finishing brads. The lichens found on the sides of decaying logs are sometimes very pretty, and well adapted for making the



RUSTIC STICK AND BOARD BRACKET.

bracket shelf. They should be dried, however, before attaching the sticks. After all is completed, in a mechanical way, a good coat of coach varnish gives the finishing touch,

Rustic Wooden Bowl Vase.—For the vase itself, take a wooden bowl of any desired size and ornament it by tacking on roots and knots after the fashion of rustic baskets. The roots and branches of the wild grape vine and the green briar, as it is commonly called, are excellent for this purpose, also the roots of the briar rose.

Use small brads for tacking. When ornamented, nail the bowl to the top of the stem and twist grape vines around the stem and through the prongs, making the whole affair as knotted and fantastical as possible. Varnish the whole with copal varnish, and if a darker hue than the natural wood is wanted, take two ounces of gum asphaltum dissolved in a half pint of turpentine or coal oil, and apply with a paint brush before varnishing.

Rustic Box Vase.—To make another vase, get a neat, strong box made of smoothly planed beech or maple or oak. In the center of each of the four sides tack on pine cones (the scales on the under side being removed so that the cones will lie flat), in any design you may fancy. At the four corners suspend a large pine cone like a tassel. This can be done by winding one end of a wire about the stem of the cone and bringing the other end up through a gimlet hole in the box, and clinching it on the inside. Or else string sweet-gum balls or acorns on a wire and festoon the bottom edge of the box by driving in small nails at intervals, and leaving the heads slightly out, so that the wire may be hung thereon and twisted once around; mount this on a standard as before, and varnish. These two vases are suitable for the house, balcony or lawn.

Rustic Bark Vase.—Bark vases are easily made, and none are more exquisitely rustic. Take any rough box and cover it with perpendicular strips of bark, fastening them with brads. Poplar bark is good, as it is not too thick or too thin, cuts easily without splitting, is shaggy yet cleanly, and does not harbor insects.

After the bark is all fastened on ornament it with clusters of lichens and tufts of the dry gray bearded moss which grows on old trees. Occasionally, lichens may be found growing in clusters like mottled gray roses; one brad through the center will fasten them to the box, and your eyes will rest as lovingly upon these everlastings as upon the growing greenery. The bearded moss can be strung upon fine wire or stout cord and hung around the bottom of the box in graceful, feathery festoons.

How to Mount a Vase.—These bark vases may be mounted on a pronged standard with the bark left on. Or if pronged saplings are scarce, take a straight, round stick about three inches in diameter, with the bark on, and the more mossy the better; sharpen one end and drive firmly into the ground and nail the vase on the top of the other end. Ornament the stem by nailing on mossy branches which extend up to the bottom edge of the box and are then fastened. These bark vases look well on the ground without any stem or pedestal.

The Log Cabin Vase.—What I call log cabin vases are simple and pretty. Take sticks of beech, maple or other wood, about an inch thick, and cut into lengths of ten, twelve or more inches. A gimlet hole must be bored an inch from each end of the sticks. Put them together log cabin fashion, one stick extending over the other; fasten them by passing a wire with a loop on the upper end through the holes at each corner, and through corresponding holes in an inch board bottom and clinch them on the under side. Mount these vases like the preceding ones, and line with green moss before filling.

Willow Twig Vase.—Still another pretty vase may be made of willow twigs. Gather them and weave them into a round, open sided basket, like those old fashioned work baskets that our grandmothers kept their balls for darning in. The bark must be left on, consequently they will be rough and probably irregular in shape, but that does not matter. Mount and line with moss.

To Fill a Vase.—For filling these vases, all the basket plants which do well out doors are suitable—abronia, sweet alyssum, lobelia, mignonnette, mimulus, tropæolums, verbenas, petunias, pansies, candytuft, the ivies, portulacas, and for center plants, begonias, geraniums, amaranths, etc. A layer of charcoal should be placed in the bottom of the vase, and the soil should be a good rich loam. To be perfectly satisfactory, the vases should be made ready at once, and the cuttings and seeds started in the house, so that the vases may be filled as soon as the weather will permit.

Wood Pile Boxes.—A very handsome box, of any size, may be made by the following process: "First pile a number of straight twigs together evenly, gluing each one firmly in place as you lay it on, until the piles are of the required size. When the glue is thoroughly dry, saw the pile through crosswise, that is, across the end, in slices, until you have a number of sheets of what, for the present purpose, may be called log veneering, as it resembles the end of a pile of logs. Now take a plain pine wood box, paint the inside or line it with tinfoil or fancy paper or silk, and cover its top and ends with split spruce glued on side by side. Then cover the front and back of the box with the log veneering already described, and the effect will be that of a little pile of logs.

"Upright braces can be placed at the two ends of the pile to complete the resemblance to a cord of wood; scraps of gray and green lichen may be glued on as taste may suggest. Of course, care must be taken to make the direction of the split spruce correspond appropriately with the position of the veneering, and when necessary, the front and back edges of the lid also should be covered with the veneering. For match safes, the cover can be simply a pine piece, of just the size of the opening, covered on its under side with sand paper, and on its upper side with spruce twigs, the projecting ends of which will hold it in place."

Upright Match Stands.—"Take a toy churn, such as is sold in the shops for two or three cents, and cover it with split spruce, tying it around about

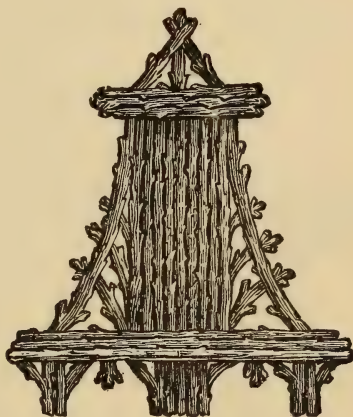
one-third from the top with a band of split spruce or of grape vine bark ; handles can be placed at the sides, and ornamental bits of moss and lichens added. The cover of the churn, if left on, should be cut away inside, so as to leave the requisite opening for the matches. It can be neatly lined if any one prefers it, but is not at all necessary.

Rustic Paper Rack.—"Cedar is the best material to use, its rough bark and many knots rendering it especially picturesque. A rustic music rack or newspaper stand can be made of five stout cedar canes, the knots cut close or nearly so, and the bark peeled off. Cross four of the canes, two and two, making two Roman XX's; connect these by a fifth and a shorter cane, and fasten them together with long, slender screws. Varnish the frame in the natural color, or stain black to represent ebony, as you prefer.

"The ends should be left open, but the sides, if you choose, may be filled in with sheets of birch, or hemlock, or other flexible bark ; or, better still, with stout gray linen or canvas bound with colored braid, lined with colored flannel to match, and with some quaint design, or else your monogram applique in flannel in the center of each side. In miniature this stand will serve as a letter or card rack, the sides in such case being of fancy cardboard worked in bright wool."



OPEN FRAME EASEL.

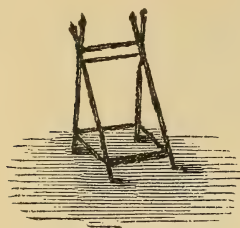


CLOSE FRAME EASEL.

Rustic Easels.—Easels, from a size large enough to hold a card up to dimensions sufficient to support a large engraving or painting, are always pretty and appropriate. Some of the home manufactured articles are more attractive than some of those purchased, for the rustic character is peculiarly fitting in way of contrast to most rooms.

For a small support one may be made after the plan of illustration. The slim shoots of the fir tree with their full buds, which have made their appearance at

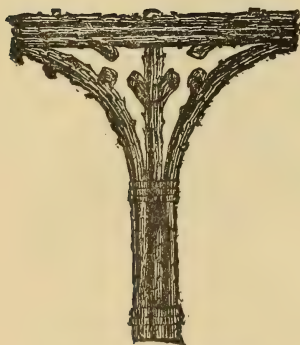
the end of June and beginning of July, after having been dried in the stove, may be turned to account for this style of work. To make the support, use four long bars crossing each other at the top, and two short ones going from point to point at the top, and four at the bottom forming a square. As a hold for the picture above and below a second square bar is put. The size of the latter corresponds with that of the picture. The long bars are about eight inches long; they are fastened together with pins as well as the ornamental ones. The knotty ends are perceptible on the latter; to complete the one end



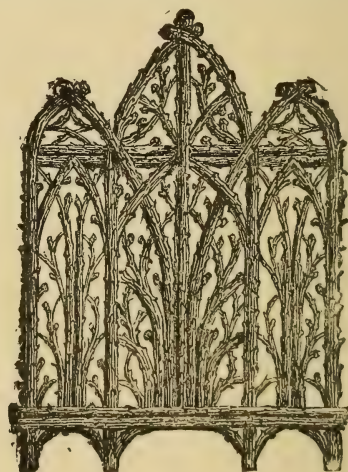
RUSTIC PICTURE SUPPORT.

they are cut off short and a pin is stuck into them to fasten them to the other bars.

Spruce twigs make very excellent material for rustic work. When cutting them, use only for surface finish such as have the terminating budding ends, as they make a tasteful finish wherever used. Fir and other trees furnish material nearly or quite as pretty if care is exercised in making a collection. In the accompanying engravings I give three styles made of spruce sticks. The open frame may have a back support or stand upon a table inclined against the wall, the picture suspended from the top or rest upon light pins put in at the



SUPPORT FOR AN EASEL.



THREE ARCH EASEL.

proper place. The close frame easel may be used in same manner; generally, however, the back support is preferable. The three arch easel is one of the most beautiful made in rustic work. It is not at all difficult to construct one. By closely patterning after the engraving, or even approximating it, one will be well satisfied with the effort.

To hold the twigs together where they cross each other, small finishing brads are much better in my opinion than binding with any kind of material. Carpet tacks should not be used, as the heads are large and unsightly, and the tacks taper so much that they will split the sticks when driven. The support should be attached at the double cross bars near the top by means of bits of annealed wire and loose enough to turn for adjustment. The small end of the support is to rest upon the table. Two parallel sticks at the base are sufficient to make the bottom rest for the picture. These are to be held by brads, and braces added if one chooses.

To Make a Rustic Cross.—Have cut two inch boards, one six and three-quarter, and the other four and three-quarter inches square. The smaller is fastened to center of larger as a base for the cross. Next have cut two sticks of three-quarter inch stuff, one and one-fourth inches wide, for the cross. The uprights should be ten inches long, and the other five and a half. Cross the two pieces three inches from end of long piece. Set cross in center of base, then cover the whole by gluing on gray beech moss.

Rustic Flower Box.—A description is given by a contributor to the press, of a rustic box very simple in construction. The box is twenty-seven inches long and twenty-one inches wide, sloping to the bottom on all sides. It is made of pine boards, and covered with bark, which is neatly joined and fitted and tightly nailed on. The top is finished with a strip of bark around the edge, and, where required, moss is glued on to cover slight defects. It is charming as it stands in the south window, with its wealth of green, made more lovely by the contrast with the mossy bark, and the beautiful handle of Nature's own curving, over which the vines twine so gracefully, with a crowning grape vine handle, and a standard of fanciful chestnut boughs

Rustic Bird's Nest.—Select a piece of wood about the size of an ordinary bracket and see that it has a convex surface. The more irregularly shaped it is, the prettier, only so that its general contour resembles the outline of a bracket. The piece should be three or four inches thick through the center. Dampen some lichens, and with these cover the convex surface, fastening them on with small tacks. Hide the heads of the tacks and the spaces between the lichens with little sprays of green moss.

Now you should have a last year's bird's nest—which is, of course, not complete without the eggs—and somewhere near the center of the top of your knot of wood there should be a hollow to receive it. Just above the nest and overhanging it tack a crooked twig on which to perch a stuffed bird. Suspend the whole with a moss covered cord, and you have a unique rustic ornament that will not fail to recompense you for the work of making, and will be sure to elicit the admiration of all lovers of forest beauties. In case a piece of wood of the desired shape and size cannot be obtained, pasteboard will answer for a foundation.

BEDS AND THEIR COVERING.

Corn Husk Bed.—For an under bed corn husks are much to be preferred to straw, for they will not become so compact after use and will wear much longer. One important feature is to secure the husks in proper condition. As soon as the husks are taken from the corn, before any mold or other harm comes to them, take the fairest and best leaves, free from all stalks, silk, etc., and spread them out to dry in some large, airy room, stirring them well every fair day for a month, or till they are perfectly dry. As they shrink somewhat, a good supply should be secured of fresh husks. Don't split the leaves; they do not become flat and solid as many suppose, but curl up and make the mass light.

A husk mattress is suitable for both summer and winter use, and at all times healthy. Wool mattresses are liable to become infested with moths. Where feather beds are used, they may be put above the husks in cold weather and below in hot.

Husk beds have something of medical value. In many cases of injuries and of diseases a hard bed is vastly superior to feathers; and as comparatively few families have mattresses, a bed every way as good as these may be quickly made for the occasion by putting the feather bed at the bottom, the husk bed above, and a comforter or other thick quilt over this. As a great remedial agent, then, every family should have one husk bed, and one is sure to bring several others.

Airing Feather Beds.—For beds which have been in only occasional use for a year, a day's airing on a sunny, breezy day, and a thorough beating with a stick are all sufficient; but those which have been in constant service for considerable time require the application of water in some manner. People who have access to an establishment where this business is done by machinery, generally prefer to avail themselves of it, and by paying a couple of dollars have the task taken off their hands. But for those who must do the renovating at home, there are three modes of procedure.

Washing Feather Beds.—One method of washing is a thorough immersion and cleansing of the whole bed in hot water; and this is perhaps the preferable mode for very thin beds, especially if the tick is soft and pliable. Of course they remain damp a long time, but there is no danger of mildew if they are frequently stirred and shaken.

Washing Feather Ticks.—The second method is to empty the tick of its contents, washing only the former. This is a much more laborious task, even, than the other, as will be vouched for by any one who has had experience of the "discursive" nature of feathers when freed from confinement. This mode need seldom, if ever, be resorted to, if good care and cleanliness are habitually exercised.

Washing Spots on Feather Beds.—An ordinary method is to take the bed out upon clean grass, and in a large tub of hot suds, draw up and wash such portions of the tick as need it—or the whole—without much wetting of the feathers. When this is done lay the bed flat upon the grass, and through the watering pot sprinkle it with, say, from two to four pails of water, turning it, that both sides may share alike. There is no danger of their becoming musty or mildewed before drying. And it is surprising how light and sweet a bed or pillows will become after the process.

A thorough drenching in a spring shower is equally efficacious, and they will dry rapidly with a little sunshine, or even without it, if frequently turned and shaken, or if spread in successive dry places as they drain. Some regard a heavy spring shower as the very best feather renovator known.

Summering Feather Beds.—For keeping through the summer it is the best way to hang them over a line, or tie them loosely in a sheet or old blanket, to be hung up in an airy closet or unused chamber. To pack them in a chest, or to flatten them under a summer mattress is a great detriment to feather beds.

Casing Feather Beds.—For preserving bed-ticks that are in common use from dust and soil, it is an excellent practice to inclose them in a case of “sleazy” unbleached muslin. Have the case a little larger than the bed and sew it up on both sides and at the top. Let it be open at the bottom, but held together by three or four buttons. This can be easily removed and washed. Many have adopted the plan of “casing” their mattresses also in this way. Musquito netting, if not too thin, may serve a very good purpose, in place of factory muslin.

To Prevent Feathers Working Through Ticks.—Empty the feathers from your tick, turn it wrong side out, and lay it on your table. Then with a piece of beeswax slightly warmed rub the tick thoroughly, giving the entire surface a slight coat of the wax. The best way, however, is to secure ticking so firm that you will not be bothered by the protrusion of feathers.

To Wash a Blanket.—Let it soak overnight in a tub of water, first dissolving two large tablespoonfuls of borax and about a pint of soap in the water. The night's soaking removes nearly all of the dirt, so that no very hard rubbing is required in the morning. After it has drained from the suds, rinse it thoroughly in two waters and hang it up to dry. Never wring blankets, as it shrinks and draws them more than anything else.

The rubbing water should be just hot enough to make it comfortable to the hands. It is not only for woolen goods that borax is useful. It is much to be preferred to soda for whitening cottons, linens and laces. One tablespoonful of it in powder thrown into four or five gallons of boiling water will save half the ordinary allowance of soap.

For washing woolen bed blankets, use soap in which there is no resin. Resin hardens the fibers of wool, and should never be used in washing any kind of

flannel goods. Blankets should be as soft and nappy when they come in from the clothes line as when they came from the store.

Airing Blankets.—A practical housewife says: "I find it an excellent plan every week or two to hang blankets and other bedding on the clothes line and let them have all the atmospheric benefits of a clear, breezy day. One's sleep is so refreshing if the bed is fresh. Woolens especially are great absorbents, and though they do not look soiled as linens and cottons do, they need a bath of air and sun as often as linens do of water."

To Make a Bed Comfort.—A lady contributor says: "I want to tell you about a bed comfort we sleep under—the prettiest, warmest thing I ever saw in my life. It was made of white cotton flannel and knotted with blue Berlin wool of a delicate shade. The contrast between the soft, white plush flannel and the fleecy tassels of the wool was exquisite. The under side of the comfort was first put in the frames, fleecy part down, five or six pounds of batting evenly laid on it, a thin covering spread over that, and the whole quilted or knotted with white thread to keep the cotton in place; then the upper covering had the blue tassels tied in.

"This has been made for several years, but was not in the least soiled; and with a single blanket was ample covering, though there were three feet of snow on the ground, and the mercury was below zero twenty degrees. In summer it is folded in a sheet and laid carefully away."

Cheap Bed Spreads.—Very pretty bed spreads and pillow shams may be made out of coarse white cotton netting. Make the spread and shams of the exact size required, and work in white embroidery cotton in some simple design. A large monogram is usually worked in the center of the spread and also the shams. Blue or pink silesia or cambric is placed on the bed and pillows before putting on the covers, and bows of satin ribbon of the same color ornament the shams.

To Cover a Quilt.—When the outsides of a comfortable or bed quilt have become tattered, if it is not so heavy that an extra covering will make it burdensome, it is a good plan to renew it in this fashion: First, wash it as clean as possible. If it dries somewhat streaky, no matter; that it shall be thoroughly sweetened is the main object, and no amount of exposure to the air or beating with a stick will accomplish this in the case of an old, long used comfortable.

Trim off the tatters of the old covering, have the new in readiness—dark is the best thing—and tack it on in the way log cabin patchwork is done; that is, holding the quilt up in your lap or on a table front of you, commencing at the nearest edge, folding the cloth back toward you. Then baste or tack with strong thread the wrong side of the covering to the quilt, making the stitches short on the right side, and as long upon the wrong side as you think consistent with a firm holding together.

When you have gone the length of the quilt, fold over another portion, say six or eight inches wide, and tack again, just as you would a block of log cabin patchwork, only that the cloth is all in one piece instead of in strips and no corners to be turned. When one side is finished, do the other in the same way. When this covering becomes soiled, it can be ripped from the quilt in five minutes and ready for the wash, while if elaborately knotted or quilted the task becomes quite formidable.

Chaff or Paper Pillows.—Dry oat chaff or white printing paper, cut fine, makes excellent pillows for infants and sick people. They are soft, cool and healthy, which cannot always be said of feather pillows.

Pillow Slips.—A very pretty pillow slip is produced by having the case just the size of the pillow in breadth and length; then cut the edges at the open end into deep points, each side alike and points directly opposite, and finish with embroidery. On one set of points sew linen or small pearl buttons and work button holes on the opposite points, so that the two may be fastened together. To complete the work, cover the pillow with a tight fitting case made of silk, with a full puff at the end to show between the points of embroidery, after putting on the slip. In place of the silk case, an end piece for economy may be put on, made of silk, with a puff, and fastened to the pillow tick.

Log Cabin Quilt.—“Procure three contrasting colors, for instance, red, black and green, of any woolen material which you desire; it will take as much of the red and black as for the ordinary way of making, the quantity depending on the size. A half yard of the green will be sufficient, as it requires little; also some half worn calico. This, cut into blocks ten inches square, which will form the foundation.

“Now take a bit of green one and one-half inches square, and pin it on the calico exactly in the center. Here will be the starting point. Cut the red and black cloth into strips one inch in width. Sew a piece of the red strip as long as the little green square on the opposite sides of it, making the stitches go through the calico just as you would in making folds; afterward turn back these strips toward the edge of the calico and pin them to keep them straight.

“Now take of the black two strips, each as long as the green square and the ends of the red strips already sewed on. These are to be sewed on the remaining ends of the green square, making them extend along the ends of the red strips. Turn these back in like manner as you did the red; thus every time you will cover up the seam. Now, again, a strip of the red must be sewed on the red, having it extend along the black ends, and then a black strip must likewise be sewed on to the black and across the red ends, and so continue using color about until the calico block is all covered, when it will be finished. When turning back the strips leave them full, so as to imitate quilting, as you quilt and piece both at once.

“After making enough blocks for a quilt, join them together to suit your fancy,

either putting the red sides together or red and black alternately. The whole quilt is made of these blocks without anything else. This is an excellent way to use up delaine or merino dresses which are partly worn; they will last a great while made after this pattern."

Counterpane in Shell Work.—Cast on forty-four stitches. First time across knit plain; second time across put over thread, knit two together, repeat, repeat, etc.; third time across knit plain; fourth time across knit five narrow, rest seam or purl, only last six plain; sixth time across knit five narrow, rest plain; seventh time across knit five narrow, rest purl all but the last six stitches, those plain; so on alternately purling and knitting the middle, except change every five times across so as to make stripes crosswise of five rows knit and five purled. Always put over thread and take off the first stitch without knitting, then knit four, and narrow the sixth and seventh stitches together; at the last end knit six plain.

Cable Border for Counterpane.—Cast on twenty-four stitches. First, knit plain across; second, knit six plain, purl twelve, knit six; third, knit plain across; fourth, knit six plain, purl twelve, knit six; fifth, knit plain across; and so on till you have knit fourteen times across, then knit six, take off six on a third needle, knit the next six, then twist around the six taken off on a needle and knit them, knit the next six plain; repeat all this.

ORNAMENTAL AND USEFUL BOXES.

Box for Newspapers.—A cheap box for newspapers may be made of an old pasteboard silk hat box. One that tapers from top downward and oval shaped is best. Cut down the sides of the box, leaving a little more than half the breadth at top and a little less than one-half at the bottom; that is, cut away a portion of the box so that it will set flat against the wall. Fit in a back made of the cover, leaving what extension there may be above to fasten by. Round the extension off nicely, or make in any shape that pleases your fancy, and sew the same in. Putting in corners all the way around of cloth well pasted, and putting in wire at top firmly sewed in place, makes the box stiff and more durable. It is now ready to ornament.

Taste may be exercised in covering with colored paper, or small figured wall paper and pictures pasted in front, heads surrounded with wreaths, bouquets, etc.; the edges should be bound with a contrasting color, gilt, velvet bordering, or scallops and points; hang with three strings, if not wired, one in front, and two on sides of front, close to back; hang with long cords, near the ceiling, like a picture, but a little lower for convenience. If a wire runs up from around the

top along the edge of the back stitched on, or covered by cloth, well pasted, the basket may be suspended by a nail and the use of cords not required.

Window Flower Boxes.—For window flowers, the box may be of tin painted green, or of common white pine, stained and oiled, with a strip of molding, or a few lichens and fir cones tacked on by way of ornament. Or prettier still, it may be turned into a rustic affair by covering it with narrow horizontal lengths of rough barked wood. Birch boughs or laurel, or both alternating, will answer, halved lengthwise with the saw, and cut into sections to fit the box, the shelf which supports it being edged with the same. Or a gaily colored affair may be made with narrow strips of oil-cloth, finished off with a wooden molding at top and bottom, a set pattern being chosen of bright solid colors, like the tiles which are so much in vogue for more expensive arrangements.

Little Propagating Box.—All that is necessary is a small wooden box a little higher at one side than the other, with sides sloping to match, covered with glass, and have two inches of sand in the bottom. The sand must be kept constantly wet, the glass always on, and the box put in the shade where sunlight will not fall upon it. The tight glass keeps the inside of the box moist, so that the cuttings never wilt. Plants, however, so treated, require to be shaded until started in pots; for if taken from the close box and put at once into the hot sun, they would wilt.

Bedroom Box.—Procure a shoe box from a store, and after hinging the top board, cover with chintz calico, with a cushion on top, to contain materials to be made up. It will be found pretty and handy. Such boxes are convenient to have in bedrooms, answering the double purpose of receptacles for various articles, and seats for children.

A Toilet Box.—Procure a box eight or ten inches square with cover hinged, no odds how plain; a boy can make one. The only essential point is to have it symmetrical and firm. Quilted or puffed satin makes a pretty lining. Pink and blue are most suitable colors. Cover the sides and top with puffed satin, or rather satin puffs. A frill of lace may hang over the puffs on the sides and a block of lace cover the top.

Handkerchief Box.—A very pretty box for keeping handkerchiefs in may be made of a cigar box or a letter paper box that opens in the center. To make one of the cigar box, line the inside with pale blue or pink silk, by pasting on with flour paste. Cover the outside with pale blue quilted satin, with the monogram on the cover in blue and pink embroidery silk. To make from a letter box, use a tufted cushion on top of satin and put an insertion of white lace around it with the same color underneath. The sides may be covered with satin glued or pasted on, and the corners or edges finished by handsome cord; silver or gilt looks best.

Another and elegant design is given by Jenny June, which is to take an ordinary box, cover it with black satin, on the lid paint a design in water colors,

or transfer a picture, having the principal flowers of blue and crimson. Around the sides put antique lace and finish the edges of the box with a silk cord corresponding with the colors of flowers. The inside of the box is lined with quilted satin and a quilling of ribbon used to cover the unfinished edges. For the feet and knobs, use large gilt beads, strung on coarse linen thread, and a tiny bead to hold the thread in place.

Portable Flower Box.—Have a box made a foot and a half wide, fifteen inches deep and as long as the window of your house is wide. The box should be made of pine, flaring, so as to be four or five inches wider at the top than at the bottom. Have it mounted upon legs long enough to bring top of box even with window sill. It may be painted, stained or covered with sticks on outside, so as to have a rustic appearance. In this case, the sticks will look better to be split in half and scraped white and varnished. If the sticks are used, first border the edges and then form into panels. See page 121.

The inside of the box should be thoroughly painted to prevent the wood absorbing moisture. "Over the bottom is spread a three inch layer of bits of broken flower pots or small stones, and on this is set a double row of pots, or as many as will stand evenly on the surface. Then a thick layer of sand is poured over the broken pieces, and the rest of the space filled up with earth till it is even with the tops of the flower pots.

"In the bed thus formed bulbs and slips are planted between the pots, and vines are started at the corners. When the latter are well under way, wires, on which the vines twist, are fastened diagonally from corner to corner, forming a beautiful green arch over what seems to be a bed taken bodily from the garden. Sometimes a tiny hanging basket, or an ivy growing in water, is hung from where the wires cross in the arch."

Parlor Wood Box.—Secure a box of appropriate size, one that is stout, and ornament in one of the three following ways, as time and means will permit: Cover with satin wall paper of pretty pattern, with sticks, as directed for portable flower box, or with a dark patterned fine floor matting. To finish the edge when matting is used, tack on either a black walnut or gilt molding, then trim with lambrequins made of light brown cloth or felt, worked in crewel or silk in the Kensington stitch, in any design one may choose. When the embroidery is finished, press lightly on wrong side. This box may also be used for other purposes.

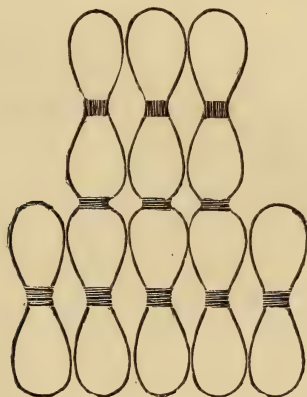
Collar Box.—Take either a round or square box of suitable size, line the inside with silk or satin, then cover the outside with plush or velvet, glued to the edges. Before putting the plush on the lid, embroider a small spray of flowers in Kensington, or make the flowers of ribbon and do the foliage in arasene. Plush or velvet makes a rich covering without the embroidery, and merely an artistic bow of satin ribbon on one corner. Handkerchief and glove boxes may be covered in same manner.

CHEAP AND ORNAMENTAL BASKETS.

Wire Hanging Basket.—Hanging baskets in certain locations are highly ornamental, and as they are easily constructed there is no excuse for not having them.

To make a wire basket, take common wire, or the hoops of a skirt, if they are to be had, and cut them into lengths, so that when formed into sections they will make links in the shape of a figure 8, seven inches long. Forty of these will be required. Then make nine of same shape four and one-half inches long, and the material is ready to put together. In making the sections, the ends are brought together and lapped in the center, where they are secured by winding with strong thread.

Use sixteen of the long sections to make the front and back, nine in each, three on each end, and the nine short ones for the bottom. This completes the body of the basket. To make the handle use eight sections put together thus :



FORM OF BASKET HANDLE.

Attach to the top edge of the basket in the center, then as a support to the front, tie the ends of two links together and attach to the center section of the front, and to the center of the middle upper link.

For ornament, use the remaining six links to hang upon the wall beneath the basket, put together after the manner of the handle, four above and two below. To give strength or stiffness to the basket, strips of hoop spring may be bound upon the front and back, in the center of the links ; this, however, is a matter of no great importance, and may be put on or left off as desired.

The size of the basket may be varied to suit the taste ; I only give dimensions to show good proportions. The handle may be made of six pieces, three at the bottom, two of the smaller size above them, and then one still smaller at the

top. The support made in the same way looks well, some preferring it to the two links. When complete, paint some lively or delicate color; pea green looks nicely.

Rustic Hanging Basket.—Rustic baskets are easily made of sticks of the oak or maple tree, choosing those of the size of a man's thumb, cutting them into equal lengths of eight, ten or twelve inches, according to size of basket desired. Then build your basket like a log hut or a log pen. Nail these sticks firmly in place. Heat a wire and thrust it through the ends of each top stick, and bend it into a loop. Through these loops pass your strings to hang your basket by. A wooden bottom should be carefully nailed in.



RUSTIC HANGING BASKET.

Cocoanut Hanging Basket.—Cut off one-third of the upper or small end of the cocoanut, take out the meat and drill three holes, equal distances apart, near the top edge. Suspend with scarlet cord or wire.

Shell Hanging Basket.—The handsomest little hanging baskets that I have ever had for parlor windows were made of cup shaped sea shells. The ear pearl shells are the prettiest, because of the beautiful variety of colors in the pearl. The shell is suspended by means of fine copper wire passed through holes bored near the top edge. This wire will not

rust, and is much better than cord, which decays and breaks by reason of the constant moisture.

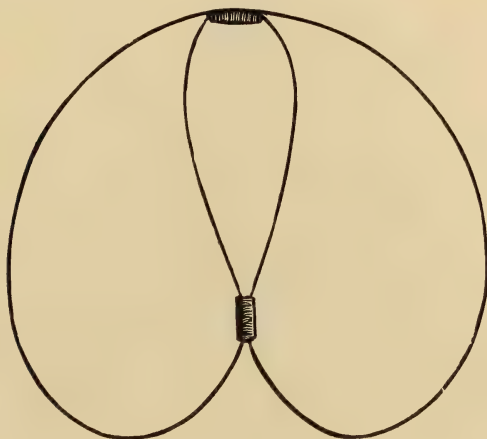
I fill the shell with rich loam and plant in it lycopodium, which is a species of running moss, showing a rich bluish green color on its upper side, and a clear green on the under. This is much prettier than what is called lycopodium moss, a plant of similar structure, but lacks the lovely variegated hue of lycopodium proper. Either of these will flourish in a shell and in a short time be of sufficient length to twine around the wires and hang over the sides. Shower it abundantly, as constant moisture is an essential requisite to its growth and richness of color.

If the hanging shell be kept in a room during winter where the temperature is not allowed to go below fifty degrees, the lycopodium will thrive nicely. This plant does not require strong sunlight and thrives best where it will not get the direct rays of the sun.

For convenience I have a cord hung from a nail in the upper casing of the

window, and in the center from side to side. This cord extends down to within easy reach, and at the end a small ring is attached. At the terminus of the three suspending wires is a little hook; this is placed in the ring, making a very convenient arrangement for taking down the shell to water the plants. When suspended, the basket hangs about the center of the lower sash.

Wire Wall Basket.—Cut wires into pieces about twenty inches in length; have them all of the same length; then join the ends together, lapping them about half an inch and fasten them with strong thread; then fasten the sides together as represented in the cut. Twenty-three of these for a basket can be used, or you can have it larger if you wish.



WIRE SECTION OF WALL BASKET.

To make the bottom of the basket, begin by taking four of those loops place them side by side, and fasten them firmly together. For the back, take four and fasten them to the four at the bottom; next take three and put together in the same way, and fasten to the four; next take two, then one, and fasten them all together.

For the front, take four of the loops and fasten to the bottom; then take three and fasten to the four. Put one of those loops at each end, fasten it to the bottom and also to the back and front. You can have a loop from the middle of the three in front, up to the one at the top of the back.

Imitation Coral Basket.—Take covered wire or the hoops of skirts, with covering left on, bend into shapes as illustrated, or other desirable forms; tie with wrapping twine, with ends of the twine left one-fourth of an inch long; cover the basket when formed with knots or ties about one inch apart all over the basket. Then take half a pound of beeswax, melt in a shallow pan, stir in enough Japanese vermilion to get the color you wish; then roll the basket in the

melted wax until it is covered completely. One made in this way is very attractive, and will stand exposure and water for a long time.

Wooden Bowl Hanging Basket.—Common chopping bowls of small size, ornamented with gnarled roots, pine cones, acorns, beans, etc., either fastened on with brads or with waterproof glue, and finished with a coating of carriage varnish, are easily manufactured, and when suspended with colored cords fastened through holes in the sides, and covered with twining plants, they are very attractive. The basket should be well filled, as illustrated, to be highly satisfactory.



ORNAMENTED BOWL HANGING BASKET.

A wooden bowl can be ornamented with scales of the long pine cones. Each scale can be nailed on with upholsterers' tacks, first boring the holes, and after the bowl is then covered, varnish with brown varnish. Even the varnish can be made at home, if one chooses. Buy two or three ounces of asphaltum and dissolve it in turpentine or kerosene, making it lighter or darker as one desires, by adding more or less of the asphaltum.

Wooden bowls, such as have been used in butter making or chopping mince meat, and become cracked or worn through, as well as three quart pans, can be used, and if one does not care to go to the trouble of nailing on ornaments, they may be painted a vermilion red or chrome green. Holes should be punched in the bottoms of the tin vessels, if they are used, before they are painted, and also

at three points equal distances apart near the rim, the first to allow escape for surplus water, and the latter to receive the suspending wires.

Glass Hanging Basket.—Broken goblets and tumblers can be made into very pretty ornaments for the window by crocheting a bag of zephyr to suspend them in. The stem of the broken goblet should be taken off up as close to the base of the bowl as possible. The less work put upon the crocheted bag the prettier it will be. Have a handsome cord to suspend it by, and a tassel at the bottom, if you choose.

Bird's Nest Basket.—Get a firmly built and pretty bird's nest; suspend with fancy cords, to which moss has been fastened, then put eggs in the nest and perch a stuffed bird on the edge.

Keg Hanging Basket.—Where a large basket is desired, a nail keg or butter firkin may be sawed in two and used. The outer surface may be ornamented by roots or limbs sawed in half and nailed on, and the inside should be thoroughly smeared with coal tar to protect the wood from speedy decay. Let several holes be bored in the bottom for the purpose of ventilating the soil, and to furnish an outlet for surplus water. Suspend with three strong wires centering at one spot at point of suspension.

To Fill a Hanging Basket.—To prepare a wire basket, the interstices should be filled with moss—that which grows on old stumps is preferable—place a bit of coarse sponge at the bottom to retain the moisture, over that lay a piece of coarse muslin, then fill up the basket with rich soil and plant the vines. A sprinkling of pure bone dust over the surface of the soil once a month will make the plants flourish vigorously. Sometimes it is desirable to place in the center of the basket a small crock containing a showy upright plant, and in that case fill up the surrounding space with rich wood and old hot-bed soil; fill in with plants of a climbing or trailing habit; when the center fades you can replace it by a fresh plant. In filling a basket select plants of a similar nature—such as like shade and moisture.

Care of Hanging Basket.—“Hanging baskets, being exposed to the air on all sides, become dry very quickly, and many plants when once allowed to become dry cannot be revived; others, like the German ivy, moneywort, etc., can be brought up again after being to all appearance dead. It is of little use to give a hanging basket a slight sprinkling every day; indeed, it is a positive injury, as it draws the roots to the surface and the plant soon dies. The basket should be taken down and allowed to soak in a vessel holding water enough to cover the surface of the ground entirely, then, while in the water, sprinkle with a small watering pot those parts of the plant which escape over the side of the vessel.”

Lawn Flower Basket.—Get the good man to flatten the top of a stump or drive three or four stakes, and put upon these, three feet from the ground, a round board or plank platform; then prepare two rings of iron rod, one about

half the size of the other—the smaller to rest upon the stump or platform, the larger a foot or so above the smaller, and then put on up and down wires from one to three inches apart, as you choose, and when completed line with green moss, and fill with dirt and suitable plants.



THE IVY HANGING BASKET.

Ivy Hanging Basket.—A very handsome hanging basket may be made with no other plants in it but English ivy. A wooden bowl may be used for containing the soil, ornamented as one chooses, but the suspending attachments should be as handsome as can be afforded. A brass or gilded chain looks very prettily in the dark green foliage. Use a sponge in bottom of basket to retain moisture, and start the growth of ivy by cuttings, simply inserting the ends in the soil. Cut back as the symmetry of the basket demands, but do not dress it so as to make the sides too regular in form.

Straw Fancy Basket.—Take a piece of cardboard fourteen inches long by ten inches wide, then cut out of an old straw hat a small rustic basket; sew it in the center of the cardboard, around the bottom and sides, but not at the top. Have ready some nice green, feathery moss, and about two cents' worth of gum arabic dissolved in warm water. Place some of the moss inside of the basket and up around the top, and trailing down the sides; that around the top and sides must first be dipped in the gum arabic on the side which is to go next the cardboard.

Mix small artificial flowers in with the moss, or wax flowers if you know how to make them. When the moss and flowers are arranged, sew a handle of the straw up over the basket. Paste gilt paper an inch and a half wide around the edge of the cardboard; hang up with a loop of ribbon. This makes a handsome and durable ornament and does not cost over twenty cents.

Worsted Fancy Basket.—Pretty ornaments, as well as useful articles for the sitting room or parlor, may be produced in many ways, but the following, described by a lady correspondent, appears to me to be specially so. It is a basket made to have the appearance of moss on the outside, produced by use of the same kind of worsted work as is used for embroidery.

Four or five shades of green, and as many of brown, in regular gradations, should be selected; the darkest shades of green being of an olive tinge, and the lightest of a yellowish hue in preference to grass green, which has not the yellow autumnal tint of the colors before mentioned. One skein of each color is sufficient for a pair of baskets.

Shape of Worsted Basket.—The shape or body of the basket is formed of pasteboard, and is usually round or oval, and made with or without a handle across, according to fancy. The pasteboard shape is covered inside and out with green silk; and if a handle be affixed, it should be sewn on outside, where the joining will be covered by the moss.

To Prepare Worsted for Basket.—The worsted of each color should be wound into a separate ball and knitted either flat or round like a stocking. A piece of thread should then be passed, by means of a needle, through the last row of loops or stitches, and fastened at each end in order to prevent the knitting from unraveling. The worsted should then be thoroughly wetted and soaked in warm water, and placed in an oven of gentle heat until thoroughly dry.

After this, the respective pieces must be unraveled and made up into small bunches, which are to be sewn so thickly on the silk, with which the outside of the basket is covered, as to leave no apparent space between them. Each bunch should be composed of about three shades of color, made up in the following manner:

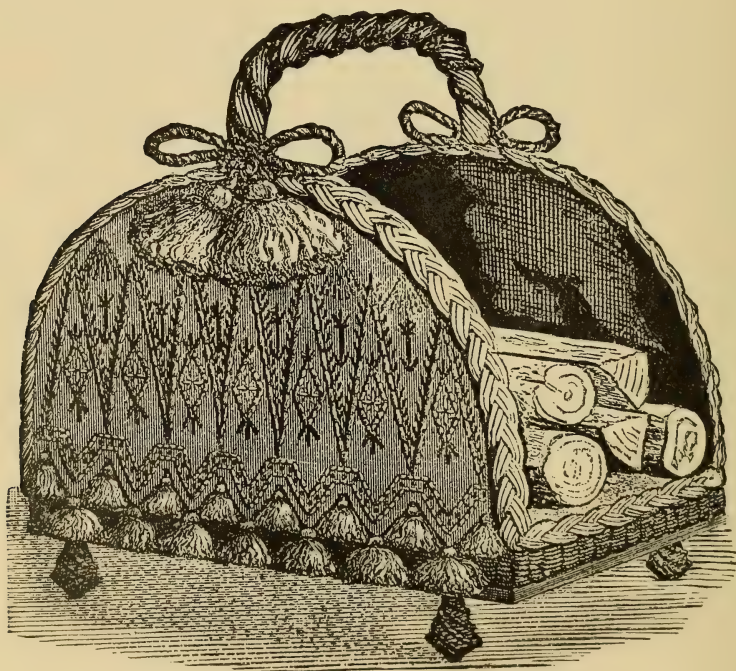
The several pieces of knitting being selected, a few rows of each are to be unraveled, and all the ends being taken up at the same time are to be held between the thumb of the left hand and the side of the hand, as low and near the joint as possible. The upper part of the thumb being then slightly relaxed, the worsteds are, with the right hand, wound around the thumb and finger of the left hand like a figure 8, and held in that position while the middle, including the ends with which it began and left off, is sewed together with a piece of silk. The bunches should be placed in heaps, according to their respective shade, and sewn on the basket according to taste, intermingling the views, so as to avoid the appearance of formality.

Corn Husk Baskets.—The materials are pasteboard, corn husks and silk or flannel of some high color. Cut out the sides six inches at the top, five at the bottom and one and a half wide; cut two more for the ends, four inches at the top, three inches at the bottom and one and a half wide; cut out the bottom five by three inches; cut a strip three-fourths of an inch wide and

nine long for a handle. Then cut lining of some material not attractive to moths.

The bottom and sides may be cut in one piece, care being taken to allow for seams at the ends and corners, and also at the top to turn down under the husks on the outside. The end pieces must be cut separately and joined to the other. Sew all the pieces of pasteboard together, letting the handle have three-quarters of an inch hold.

Cut pieces of corn husk three-eighths of an inch wide and one and three-quarters of an inch long, cross the ends; sew firmly to the pasteboard (beginning at the top) so as to make the points thus formed stand outward. When the whole is covered, fasten the lining by tacking here and there with silk of the same color.



HOME-MADE ORNAMENTAL WOOD BASKET.

Wood Basket.—Where wood is burnt in sitting rooms, or in the costly open fireplaces of the drawing room, ornamental baskets for storing it are fashionable, and they have the advantage of being portable. The design illustrated is of wood, and any boy with a little mechanical genius can make it. The sides may be rendered very firm by putting in a cleat two inches square and driving nails or screws from under side and outside into this.

The handle is made of a barrel hoop, and when you have all of the fancy work finished, plait small hemp rope and fasten on the edge; wind the handle with the same, and then varnish. The legs and lower portion of the basket are also wound with rope. If preferred, chair casters may be substituted for legs.

The inside is furnished with a lining of brown or red felt, or strong cloth, and on the outside is first tacked a covering of silesia to match in color the inside lining; then a valance of garnet felt embroidered with black, bronze and blue wools. The darkest shading in the illustration designates where the black is used, and the bronze and blue can be placed to suit the taste.

There is no need of having the design stamped; a sufficient guide for the embroidery is given in the illustration. First cut the felt into points, then with a foot rule and lead pencil draw the parallel lines shown over the points. These drawn, you will have a guide for outlining in same manner the Vandyke points above, keeping them exact by measurements with the foot rule.

The embroidery is of the simplest description and is done by merely laying a thread of single zephyr along the pencil lines and fastening it in place by cross stitches of gold silk equal distances apart, as shown in illustration. The dots between the parallel lines above the points are commonly called French knots, or seed stitches, and are made as follows: Draw a needleful of zephyr through the cloth from under to upper side. Hold about three inches of the zephyr taut in the left hand and twist it three times around the needle, which pass back through the cloth at the same point it was drawn through, and when the zephyr is pulled down close a French knot will be left on the surface.

The tassels on and between the points are what is known as crewel tassels, or else made from the same wool used in the embroidery. Heavier tassels and a heavy cord made in the same manner decorate the handle. A good size for the basket is eighteen inches in width by two feet in length.

To Make White Crystal Baskets.—Baskets made of copper wire may be crystallized in various shades at a very small expense. The basket for this purpose should not be large, but may be made after any desired pattern.

Dissolve alum in hot water until you have a saturated solution; place the basket in the mixture and let it stand in a quiet place until the wires are sufficiently coated. It can be determined by examination.

Blue Crystal Baskets.—Use saturated solution of blue vitriol. It may be necessary to use the second solution to obtain the desired coating or crystallization; manage the same as for white crystal baskets.

Ruby Crystal Baskets.—Use the red prussiate of potassa, as this will dissolve in its own weight of hot water. Apply same as for white crystallization.

Yellow Crystal Baskets.—Use ferrocyanuret of potassium. Immerse same as for white crystallization. After the basket has been crystallized it should be put under glass to keep it in its full beauty. The crystals being soluble in water, it cannot be washed

TIDIES AND RUGS.

Primitive Articles.—Tidies and rugs are among the essentials of house furnishing. The primitive tidy was a netted or crocheted affair of white cotton, starched stiff, and had a depraved fashion of continually slipping off the chair, much to the discomfiture of the occupant. The primitive rug was a braid of three strands of cloth sewed round and round, eminently useful and long enduring, but of no great pretensions to beauty.

From these humble beginnings a multitude of fashions for tidies and rugs have come in vogue from time to time, and a collection of the various styles of these two articles would be an interesting exhibition of feminine invention and ingenuity.

Muslin Tidies.—Occasionally a woman may be seen cutting circles about two inches in diameter from scraps of bleached muslin. The edges are turned in and gathered with a strong thread, then drawn up and fastened. When flattened out the result is a tiny wheel, with the gathers radiating from the center like the spokes from a hub. One hundred and forty-four of these wheels joined together on the under side by strong stitches make a square tidy. It is finished with a fringe of cotton yarn drawn through with a needle, tied and cut three inches long. This tidy has the virtue of being cheap and able to stand any amount of hard usage.

Other very durable tidies are made of white bleached muslin or of pique braided or embroidered with coarse cotton. The edges are worked in tiny scallops or hemmed and finished with lace.

Squares of sheer white muslin edged with plaiting or frilling, and tied at the corners with colored ribbon bows, are the most easily made of real pretty tidies.

Phantom Tidy.—A lady writer says that one of the daintiest tidies she has seen was made of Swiss muslin with designs of fern leaves upon it. The leaves were placed on the muslin in graceful shapes, and the fabric not so covered was sprinkled with ink; the leaves were then removed, and lace sewed around the edge with bows of ribbon at the corners. This "phantom tidy," as it was called, elicited many expressions of admiration for its simple and exquisite beauty. It seems that care will be required in making a good distribution of the ink, and I would recommend putting it on in the same manner as for spatter work. See page 523.

Plush and Silk Tidy.—An artistic and beautiful tidy is produced by a combination of two blocks of plush and two of white silk. The blocks are each five and one-half inches square, and of the plush one is garnet and the other blue. The white silk blocks have each a small spray of flowers painted or decalcomanied on, or they may be embroidered.

Join the blocks to form a square, with fine torchon lace inserting, and border the square with a torchon lace edge.

Scarf Tidies.—Japanese scarfs—to be had wherever Japanese goods are kept—make exquisite tidies for plush furniture, particularly when the chairs and sofa do not show any wooden frame work at the top. The scarfs are a yard and one-quarter or a yard and one-half in length and two to three-eighths wide. The material resembles linen cheese cloth in texture and the scarf ends are beautifully done in Japanese silk and tinsel embroidery. To use for a tidy, tie a loose knot in the center of the scarf and lay it across the very top of a chair.

An artistic effect is produced by these scarfs draped over the corner of a picture frame or an ebony easel. A more effective easel drapery is a scarf of pink pongee half a yard wide, embroidered across the ends in outline work and fringed out. Scarf chair tidies of pongee in the natural and dark shades are made in the same way.

Wash Blonde Tidy.—Squares of round meshed wash blonde darned with white embroidery cotton in a delicate pattern of vines and leaves and edged with lace make quite pretty tidies. They may be lined with bright colored cambric, if preferred.

Damask Linen Tidy.—Gorgeous tidies are made out of what at first sight appears to be the most inappropriate materials. One is a square or rectangle of unbleached damask table linen, with star, leaf, diamond, or Roman key patterns. The figures are worked over in long stitches of worsted or silk, the damask furnishing both the groundwork and patterns. The linen is then raveled out all around for a fringe and the tidy is done.

Hand Woven Tidy.—Take four pieces of lath of equal length, and fasten them securely at the corners into a square frame, as large as you wish the tidy to be. Drive tacks into this at the corners and in all four sides, one and one-fourth inches apart. Fasten one end of a ball of white wool on one of the tacks next the corner, carry to the one on the opposite side and back, then back again, leaving three threads in a place; carry to next tack, then proceed as before, till your frame is filled.

Turn it and cross the "warp" thus made at right angles in the same way; then turn your frame again and wind the wool cornerwise, dividing the check squares into triangles; turn the frame again so as to cross the last at right angles. Now with a yarn needle and red wool fasten all corners where all courses cross, leaving several ends at all the outside crossings. Cut the wool from the tacks. Trim the edges even, leaving the ends as little tassels, and you have a perfect gem of a tidy.

Stair Linen Tidy.—A handsome tidy is made of stair linen with diagonal bars each way, and a leaf pattern in the spaces. The leaves are embroidered with zephyr in satin stitch. The cross bars are covered with black velvet ribbon of the same width, fastened on both edges by button hole stitching of gold colored

silk. The edge of the tidy is fringed out. Rich shades of scarlet or crimson, or several shades of green, are the handsomest for these tidies.

Turkish Towel Tidy.—A beautiful tidy is made of *ecru* Turkish towel-ing and *applique* work. Set figures are cut from bright colored cloth, arranged according to fancy, and fastened on the toweling in half polka or button hole stitch as preferred. Dragons, butterflies, and leaves of brilliant colors are the favorite figures. The bodies of the butterflies must be worked in satin stitch, and the scales of the dragon in point-russe.

The edge may be finished with several rows of loose chain stitch in gold and black. Inside of this a vine and tiny leaves of embroidery and cloth *en applique* may be arranged if fancied; or the edge may be ornamented with gimp or with several rows of skirt braid of different colors, sewed on in button hole stitch.

To Knit a Tidy.—Cast upon very coarse needles ninety-two stitches, knit across plain like the heel of a stocking, seam back, knit across plain as before, then seam back. Commence, narrow eight stitches into four; put your thread up over once, making a loop stitch hole, and knit one stitch, thread over, knit one, thread over; knit one, thread over; knit one, thread over; knit one, thread over; knit one, thread over; knit one, thread over; narrow eight times, thread over; knit one, thread over; knit one, thread over; knit one, thread over; knit one, thread over; knit one, thread over; knit one, thread over; narrow eight times as above on the right side, across, seam back, knit across plain, seam back, making three times across between eyelets according to rule. You can have it as long or as short as you choose. I have one for a common lounge made of carpet warp. Trim with fringe or not, as you think best.

Silk or Satin Tidy.—Black silk or satin makes handsome tidies for crimson covered chairs. A monogram may be embroidered in the center with crimson, and crimson ribbon bows used to fasten them to the chair. The edges may be hemmed and stitched with crimson, and finished with black lace or decorated with a tiny vine or rows of coral stitch in crimson. A group and border of autumn leaves embroidered in shades of scarlet and oak would be very effective for these black tidies.

Imitation Moss Rug.—In making rugs, two important points must be considered—the amount of work and time required. In these days, when quite handsome rugs can be purchased for a small sum, it does not pay a woman to spend all of her spare time for weeks and weeks over a rug, even if the materials do come out of the rag bag and therefore cost nothing. The drawn coffee sack rugs in figures of cats, dogs, bouquets, etc., the rugs made of scores of small circles of cloth hemmed on each other, and many other kinds are open to this objection.

Imitation moss rugs are among the handsomest of home manufacture. Take a quantity of old white or light yarn hose, nubias and knit shawls, and dye them

in shades of green ; ravel out and sew in small bunches or tufts on a stiff foundation.

Cloth Rug.—A pretty cloth rug is quickly made of pieces four inches square, doubled once diagonally and gathered to form a leaf, and sewed on a piece of hemp carpet or stiff canvas. Begin at the edge and sew around, concealing the raw edges in the center with a small cross or diamond of tufted yarn or wool. Drab and blue, or green and crimson combine well in these rugs.

Wool Rugs.—Wool rugs are made of wool dyed in various colors and sewed on coffee sacks or other foundation with coarse thread, taking care to conceal the stitches. The rug may be in one, two, or more colors, and in whatever figures one chooses to design.

Coffee Sack Rugs.—Select coffee sacks that are of even texture, and have them washed and ironed smoothly, or, if you prefer, buy the same material by the yard, which will be still better, as it will be clean and with the original stiffening. The rug must be cut of the desired size, allowing for the fringe, and then worked in cross stitch with coarse wool, just as one would work on Java canvas.

Some rugs are very handsome when done with a Persian pattern, and if preferred, the designs may be made very pretty by introducing an applique center of scarlet, crimson, blue or green cloth or flannel, button hole stitched to hold it down.

The edge is fringed out in the usual way, being secured by the button hole edge. The more it is worked the handsomer it will be, and even for a table cover for a common stand or center table the effect is excellent, and it will be found very durable.

Chenille Rugs.—Chenille rugs may be made from old bits of all sorts of bright and neutral tints of woolen, silk and cotton, which are usually considered fit for nothing but the rag bag. Cut these in small bits, of almost any shape, as their form will allow (though it is better to cut them nearly square, if you can); take a coarse needle and strong linen twine, double in long needlefuls and string these bits of rags.

After the string is full, take some shears and trim off the ragged edges, so as to make the roll as round as you can ; when you have enough string, take a piece of tapestry or Brussels carpeting for a center, and sew on the edge a strip of your chenille ; then, on that another strip, and so on, just as you do braided mats.

Carriage Rugs.—For carriage use, rugs are made of heavy burlap canvas, colored gray, brown or black, and embroidered in showy patterns with coarse Germantown wool in long cross stitches. A raveled fringe finishes the edges. To make it sufficiently heavy a strip of burlap of rather more than twice the width of the fringe is folded through the middle, raveled on both edges and sewed under the fringed edge of the rug.

Scrap Rag Rug.—A lady writer directs to take a piece of hemp sacking, and draw some pretty design in the center—a bouquet of flowers, a wreath or some animal—mark a border with a chain or heraldry pattern; sew the canvas into a frame like quilting frames, only smaller, so as not to occupy too much room. Have a hook made like a crochet hook or needle; one can be manufactured easily by taking a parasol brace or a piece of wire and filing the end into a proper form. Cut the scraps of cloth into strips of half an inch in width—if thin fabric make it wider—pass the hook downward through the canvas with the right hand; have the cloth underneath the frame in the left hand; insert a loop on the hook and draw it to the upper side about three-fourths of an inch.

Leave about three threads space and close in another loop; regard the selection of colors so as to shade them nicely, and keep the form of your pattern—it is very quiet, easy and fascinating work. Work the figures first, and then draw in the filling up, or groundwork, with some dark color—black, brown or drab; after it is completed, shear the whole surface evenly, but not too close, and you have a fine, substantial, durable rug that will last a lifetime, and do more service and be prettier than any imported article that would cost anywhere from ten to thirty dollars; and the best of all is, that it is home-made.

Rugs of Skin.—Sheep skins dyed, and fox and calf skins tanned, make warm, convenient rugs for winter use. Line them with black cloth and stitch narrow, pinked strips of red or blue cloth around the edge.

Yarn Rugs.—Yarn rugs for common use may be made of old woolen stockings. Make your foundation of burlap; cut your stockings in strips, about one and a half inches wide; ravel them, leaving about one-fourth of an inch for sewing on to the foundation. Begin at the outer edge, and sew around the rug the unraveled edge of each row, just covering the part sewed on of the preceding one.

Take Etruscan cloth or Turkish toweling, cut in any shape you like; cut out figures, of thick flannel or bright colored cloth, and button hole stitch them on with worsted or fine yarn; cut a border of some pretty design; put it on in the same way, and either bind the edge or trim with short, heavy fringe.

By using a foundation of old, but strong white cotton, lined with something firm and durable, and putting on figures of black and bright colored cloths, and trimming the edge with a strip of black cloth scalloped, a very pretty rug may be made.

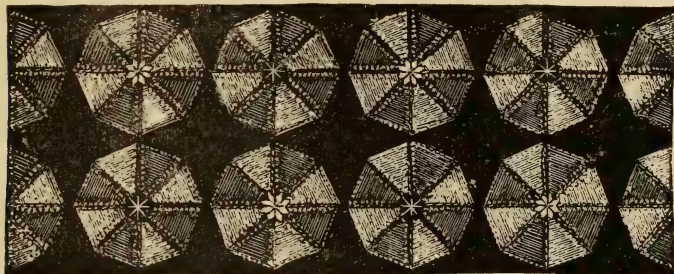
Checker Board Rug.—A small rug may be easily made by weaving contrasting colors in the checker board pattern. Take a strip of cloth of the proper length for your mat, two feet and a half long (which is the width of an ordinary door) and an inch wide.

Prepare fifteen of these strips and tack them smoothly to a board or old table, making the edges touch each other. Then take the contrasting color and weave it in strip by strip, at right angles to the first, until the whole forms a

smooth and close web. With strong thread fasten the outer edges firmly in place all around; remove the tacks; sew on the border, and the rug is done. A border of black pieces, cut in semicircular form, and notched evenly with a pair of scissors, makes a pretty finish.

Rugs of Carpeting.—The most easily made rugs, and perhaps as satisfactory as any, are of pieces of carpet, bordered. The carpet may be doubled or lined and quilted. The border may be of coarse embroidered or applique work, or of braided cloth, or of bits of rags drawn through coffee sacks, or like any of the above described kinds of rugs.

Fringe for Rugs.—Handsome fringe for rugs can be made of coarse Germantown wool or of yarn. Strips of woollen cloth two or three inches wide, and cut fine nearly across, will answer very well for fringe, where two or three thicknesses are sewed together.



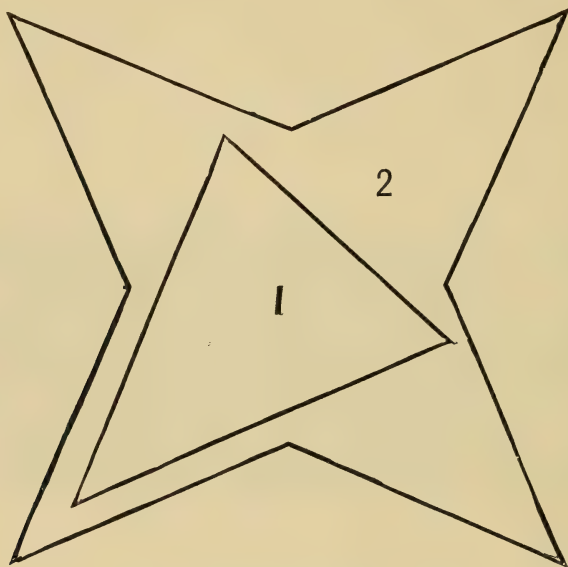
DESIGN FOR SILK AND VELVET SOFA QUILT

Silk and Velvet Sofa Quilt.—A most useful, and in these days of draperies, an ornamental adjunct as well, to a sofa, is a silk quilt. It is substituted for tidies. The *Ladies' Manual* gives an effective design which is represented at full size in figures one and two. The four pointed star is of black velvet, and the octagon shapes can be cut from miscellaneous scraps of silk, but if colors are selected using two shades only in each octagonal block, the result is simply beautiful: for instance, two shades of pink, two of blue, olive or brown, cardinal and gold. The small daisies in the center are made of tufted worsted or filling silk, or they may be omitted.

Baste all the pieces on paper, overhand them and then pull the paper out. To obtain a pattern by which to cut the blocks oil a piece of thin writing paper with lard or kerosene, and it will become transparent, so that it can be laid over the illustration of figures one and two, and the exact outlines drawn. Cut out the figures from the oiled paper—making allowance for a seam all round should you desire to enlarge the blocks—lay them on a piece of thin pasteboard and cut it. The result will be a serviceable and firm pattern, and by reference to the illustration it will be seen that eight of the small triangular shapes are used in a block, which is an octagon.

A section of this patchwork, the size and shape of illustration, makes a pretty finish for the ends of a felt table scarf, and with the addition of silk balls or tassels tacked across at intervals, a really handsome scarf is produced without any embroidery being done on it.

Effective borders for table covers and scarfs are made from the "Crazy Jane" silk patchwork, also sofa pillows and cushions for reed chairs.



PATTERNS FOR CUTTING SOFA QUILT BLOCKS.

Home-made Persian Rug.—A description of a very cheap and pretty rug is given by the *Ladies' Manual*. It directs to get from some carpet store a supply of scraps of tapestry Brussels carpeting; pieces that are too small to be worked up into hassocks are quite large enough for the purpose. Cut these into strips of any length their size allows, but let them be of uniform width, say three inches. Ravel these all out, rejecting the linen, and collecting in a box the little crimped worsted threads.

Provide yourself with a pair of the largest size steel knitting needles and a ball of the coarsest crochet cotton, either white or colored. Set on ten stitches, and after knitting a row or two to make a firm beginning, go on as if you were making a garter, but with every other stitch lay a thread of the crimped wool across the needles.

After knitting the stitch, take the end of wool which shows upon the wrong side, and turn it toward the right side, knitting a stitch above to secure it. Then put in another thread of wool and repeat the process. The back of the

strips should have something the appearance of that of a body Brussels carpet, while the front should be like a sort of thick, long napped plush.

The colors may be used without selection, making a sort of *chene* effect; or carpets may be chosen for raveling which show only shades of scarlet or blue; or brown carpets may be used for the center of the rug, and a border of scarlet or blue sewed on all around. After doing a little of this work, many ideas as to arrangement of colors will suggest themselves, and a little practice will enable the knitter to produce some very pleasing results.

When the strips are all finished they must be sewed together at the back. It is only for convenience that they are knitted in strips—the rug, as a whole, would be very cumbersome and unwieldy to handle. Some ladies edge a Brussels or velvet carpet hearth rug with a strip of this knitting, thus giving a very pretty finish. Small mats for placing in front of bureaus are also very pretty made upon the same plan.



HOW TO MAKE MATS.

Crocheted Mat.—A pair of them can be knit in a single evening. Begin by making a plain center consisting of successive rounds of dc. (double crochet, long stitches), separated by one ch. (chain stitch), widening sufficiently to keep it flat. For the first round of the border knit four sc. (single crochet), then seven ch., skipping three stitches in the last round of center; repeat the four sc. and seven ch. until this round is completed. Second round of border; knit four dc. over the four in first round, then into each of the seven ch. make a dc.; separate these dc. stitches by one ch. Repeat until second round is completed.

The next and third round consists entirely of treble crochet stitches. One into each stitch of the second round. Fourth round, make seven chain and fasten by a sc. into each stitch of the preceding round.

The center of this mat is of white, single zephyr; border of two shades of light green or coral single zephyr. The border is very full and of feathery appearance. A mat of ordinary size requires a half ounce of white and one and a half of colored worsted. It should be crocheted very loosely, especially the last row, consisting of chain stitches. Upon the observance of this depends the prettiness of the mat.

Washstand Mat.—To make these, crochet a center of No. 10 German tidy cotton, consisting of solid rows of double crochet (long stitches), widening sufficiently to keep it flat and crocheting tightly. Make the center the exact size of the bottom of the pitcher, bowl or toilet piece for which it is designed.

Commence the border by crocheting two double crochet, one chain and then

another double crochet, through the back vein of a single stitch of the preceding row. This forms a cluster, which knit again after skipping three stitches, and so continue until the row is completed.

The second row consists of clusters of *three* double crochet, one chain and then one double crochet, *all* passed through the chain stitches of the first row. The third and last row is knit the same as the second, except making *four* double crochet before the chain.

If these mats are used upon marble, a border of scarlet worsted is particularly pretty. The scarlet will retain all its brightness in washing if a little washing soda is used in the first water and the mat immediately rinsed in cold water.

Muslin Toilet Mat.—A pretty and very quickly made toilet mat of dotted swiss may be produced in the following manner: Get swiss in which the dots are about an inch and a quarter apart, and having cut a square piece two inches smaller all round than the size you desire the finished mat, embroider stars on every other square in the swiss designated by the dots in any color of single zephyr matching the furnishing of the room. The stars are simply threads of the zephyr crossing each other in what is known as the double cross stitch.

To finish the edge of the mat cut a ruffle three and one-half inches wide, fold a narrow hem on each edge and fasten it in place by taking stitches "over and over" with the worsted; gather the ruffle also with the worsted, leaving a narrow heading, and sew it around the edge of the mat which is to be laid on a foundation piece of white paper cambric.

Double Ruffle Mat.—Mats of India muslin, which washes so nicely, are very prettily finished simply with a double ruffle. Cut the ruffles of equal width, sew one on the edge of the mat and the other the width of itself inside this, covering the raw edges with narrow nainsook inserting.

Have the ruffles fluted, and laying the mats over colored silk, the effect is charming. India or book muslin mats trimmed with an inserting and edge of the new guipure lace, such as is used for curtains, are rather handsomer than the ones just described. The lace should be as cobweb like as possible.

Cheap Foot Mat.—A lady writer says that a very inexpensive foot mat may be made of a plain colored delaine dress, no matter how old—or if you want two colors take two dresses, and arrange the shades to suit yourself—cut bias strips two inches wide, fringe the edges with a large pin—you can do it very fast—run a thread through the middle, draw it up together almost as tight and close as you can, then sew this on to some firm foundation. You want to commence in the middle and go round and round.

It takes a great deal of material, but that doesn't matter, for it can be made of what is good for nothing else. If you haven't enough to make the whole mat in this way, cut a plain center piece of black cloth, or something which will last, and sew the fringed gathers around it. After it is sewed on trim it evenly, and it will have the appearance of a chenille foot mat.

Another Method.—Another way is to take an old pair of black pants—or any other plain color will do, of course—cut about a dozen yards of inch wide strips; then cut some red, or bright colored flannel the same way; if you haven't any old, you can get coarse scarlet flannel for thirty cents a yard, plenty good enough, and one yard will make two mats.

Prepare some good calico, or something firm for the foundation; then cut a piece of black two fingers wide and five fingers long, and baste it in the center of the foundation. Lap the red on this piece, the right sides together; run it across one side with coarse carpet thread; cut off the end; roll it over and baste it down "log cabin" fashion; put the red on again, laying it so it will cross the end you cut; run it, turn and baste again. Go clear around the black center with the red, then with the black alternating, until you have the mat as large as you wish. Those who have made "log cabin" bedquilts will not need all these instructions.

For the edge, put on a plain piece of black about an inch and a half wide, and pink it if you have an iron. If you have not, take either black or red three inches wide, cut little slits an inch and a half long every half finger; take each piece up separately, double the corners in, run it across, turn it, press it down well, and you will have even points all around, which will look better than pinking.

If you choose, you can make these mats octagon shape by cutting the center piece that shape, and if you want it to look extra nice, embroider a dog, a bird, a monkey or a large initial in the center of the black with gray worsted. You will have to get this stamped first, unless you have considerable ingenuity.

Knit Rag Mats.—Almost every family have a receptacle where cast off garments are allowed to accumulate, which are too good for the rag bag, and not profitable to be made over into articles of wearing apparel. These may be made into sightly and useful mats.

Select a goodly quantity of gay colors; wash thoroughly, and when dry cut or tear in strips about a half inch wide; if cut on the bias the rags work all the better, for then when knit, the strips look like plush. The more pains you take in cutting or sewing the nicer your work will look when finished.

You will want a pair of wooden needles three-eighths of a yard long and as large around as a common pipe stem; they must be very smooth, or else your stitches will catch. Before beginning to knit the rags you will want to decide what shape you wish for the mat.

If you wish a large, black diamond to form the center piece, cast on three stitches; knit "garter fashion;" widen at the ends of the needle every time you knit across, until you have thirty stitches; now knit plain three or four times across, then commence and narrow at the end of the needle until you are reduced to three stitches; bind off, and thus you have the starting point. Now cast on seven or eight stitches, knit a strip long enough to reach around the center piece, bind off, sew together and sew on around the center piece,

By laying your work on a table or stand when sewing, you will get it much truer. You will get a right curve to your strip by knitting the outside stitch every time you commence, on one side only. The second piece may be made from green delaine, the next strip (like the first, only a little longer), hit or miss rags—very bright colors—or very short pieces sewed together.

Next strip green delaine, next hit or miss, divided by rags of a bright maroon color, forming a very pleasing contrast; the last row may be made of green delaine knit with a scalloped edge, bordered by a crocheted edge of scarlet yarn or any other colors to please.

Wall Protecting Mat.—Get a yard of fine cord Marseilles. Have your initial stamped in the center, also appropriate designs in the corners for braiding. Braid the whole with the linen star braid, and finish the outer edges by sewing on britannia frilling. This makes a neat and pretty protector for the wall back of a washstand.

A set of pretty mats for the stand can be made of the same material. Cut circular mats of the size required, braid the initial upon the center of each; line them and finish the edges with a scallop in button hole stitch.

Washing Toilet Mats.—In washing toilet mats, they should not be starched, as it will cause them to fasten to the bottom of bowl or pitcher, so that they will be displaced whenever either of those articles are moved.

Corn Husk Mats.—Select the second layer of husks, rejecting the brown outside ones. Tear them into strips lengthwise, about an inch or inch and a half wide. Lay them on the grass or in a tub, and with a broom sprinkle water upon them until damp enough to be pliable.

Begin by making a round bunch of husks about a finger's size, tying the bunch at the base or near the butt ends with a stout string, then divide into thirds and braid flat. When the strand on the left hand side is brought over each time, add one or two husks, leaving the butts projecting half a finger's length. Braid in the tops, and so continue until a strand about twenty feet long has been made. That size will make a good sized step or door mat. Sheep shears will be found most convenient for this work.

Trim off the projecting butts to even length with a pair of shears, then wind and sew the mat with strong twine. The sewing, of course, is done on the under or smooth side. The sewing should be done before the husks are dried, or if dried, should be dampened. If not true enough to please the eye on its brush surface, the mat may be bent and dressed off with the shears.

Another Method.—A rural lady says: Take an inch board of the size desired and bore three-fourth inch holes through it, with the centers two inches apart; into these draw dampened corn husks, and trim off an inch or more long on each side. This mat is good either side up. Anybody can easily make one, and people can keep their boots and shoes clean, much to the gratification of good housekeepers,

How to Wash a Sheepskin Mat.—The first thing to be remembered is, that it must not be washed in too hot water, as that would spoil the color of the wool and make it quite yellow. Boiled soap must be used in sufficient quantity to clean the skin well, after which it must be thoroughly rinsed in cold water till the whole of the soap is removed. It should not be put into water with much blue in it, but enough should be used to make it a clear white.

The mat may be put in the sun to dry, but care must be taken not to leave it too long, nor to put the skin uppermost, but always the fleecy part, otherwise it will become stiff and will crack.

To prevent all chance of this it must be very frequently shaken while drying, as this is an important part of the process, and is of as much consequence as the washing. If the mat be a colored one, some ox gall should be mixed with the boiled soap to preserve the dye.

Table Mat.—A fine mat for very hot dishes is made of two circular pieces of heavy brown paper, each covered with scarlet flannel, or white, if you prefer.

On one side sew porcelain buttons—white-centered ones with scarlet borders are the prettiest—in the form of a star or stars, diamonds or squares, with a double row around the edge. Lastly, join the two pieces together by top stitching the edges all around. You may make them also of an oblong form for vegetable dishes or meat platters.

Mat for Matches.—Cut sheets of sand paper in circular and octagonal shapes, fasten upon pasteboard, and bind with bright colored braids. A ring should then be attached to each, and the whole hung near the match safe for use whenever a match is lighted. The unsightly marks that disfigure many walls may, by this inexpensive and simple arrangement, be entirely prevented. There should be one in every room in the house.

THE MANAGEMENT OF FABRICS.

How to Wash Flannels.—The principal reason that flannels do not look as nicely as expected after being washed may be attributed to the fact that they are not usually washed separately from the other clothes. They should never be put in the same water with linen and cotton goods, as they will not only gather all the lint and dirt in the water, but be injured in the brightness or liveliness of color.

Always use warm suds, never hot, performing the labor as soon as possible, and do not apply soap directly to the flannel. Rinse in clear, warm water, never cold, and place where they will dry readily. Colored and white flannels should not be washed together, and if in the same water, put through the white

first. If flannels are put into dirty suds, the water is made cleaner thereby, but the fabric but little, if any, improved.

To Wash Merino Stockings.—The same method should be pursued as for flannels and all woolen and cotton goods. Boil the soap to make a lather, wash them in this warm, and rinse in a second lather (if white, mix a little blue). Never rinse in plain water, or use cold lather; and never rub the soap upon merino or flannel; the one shrinks, the other thickens and spoils the wool.

To Restore White Flannel.—To restore the original appearance to white flannel which has turned yellowish by lying for a long time or by wear, soak for an hour in a weak solution of bisulphate of soda, then add a little dilute muriatic acid, stir well and cover the vessel for twenty minutes. After this, take the flannel out, rinse in plenty of warm, soft water and dry in the sun. The flannel will be purely white.

Another Method.—Use one and a half pounds of white Marseilles soap in fifty pounds of soft river water, to which is added two-thirds of an ounce of spirits of sal ammonia, and the whole thoroughly mixed. The flannel is to be immersed in this solution and well stirred around, and afterward washed off in pure water.

The same result may also, it is said, be obtained still more quickly by immersing the flannel for an hour in a dilute solution of acid sulphate of soda, and then stirring in dilute hydrochloric acid, in the proportion of one part of acid to fifty of water. The vessel is then to be covered over and allowed to remain for a quarter of an hour, when the articles are to be removed and thoroughly washed.

To Wash Colored Fabrics.—Before washing any colored fabrics soak them for some time in water, to every gallon of which is added a spoonful of ox gall. A tea cup of lye in a pail of water is said to improve the color of black goods when it is necessary to wash them. A strong, clean tea of common hay will preserve the color of French linens.

Vinegar in the rinsing water for pink or green will brighten those colors, and soda answers the same end for both purple and blue. Sugar of lead is good for preserving the color of blue. Put one ounce of the sugar of lead in a pail of cold water, and soak the fabric for two hours therein, and dry it before washing.

To Prevent Prints Fading.—Take the dress when it needs washing, and dip it in a pail of salt water, and dry it before sending it to the wash. This should be done before the dress is washed the first time, and the process need never be repeated.

Second Method.—Put wheat bran in a bag, boil and take half the water to wash in, half to rinse in; use no soap. This will cleanse them without fading and stiffen them without starch. Iron on the wrong side and they will look as if just out of the store,

Third Method.—Make a lather by boiling soap and water together ; let it stand until it is sufficiently cool for use, and previously to putting the dress into it, throw in a handful of salt ; rinse the dress without wringing it in clear, cold water, into which a little salt has been thrown ; remove it and rinse it in a fresh supply of clear water and salt. Then wring the dress in a cloth and hang it to dry immediately, spreading as open as possible, so as to prevent one part lying over another. Should there be any white in the pattern, mix a little blue in the water.

Fourth Method.—The first requisite is plenty of water ; this is even more essential for colored than for white clothes. It should not be hot enough to scald and should have a moderate suds of hard soap before the garments are put in. Wash calicoes in two waters, using but little soap in the second. When clean, rinse them two or even three times in tepid water. Good laundresses always assert that the great secret of clear muslins is thorough rinsing.

The quality of starch used affects light colors, and for muslin dresses especially only starch of the purest quality should be used. When no very great stiffness is required, it is a good plan to stir the starch into the rinsing water ; it assists in setting the colors where they show a tendency to run.

Fifth Method.—Infuse three gills of salt in four quarts of boiling water, put the calicoes in while hot and leave them till cold ; in this way the colors are rendered permanent, and will not fade by subsequent washing. So says a lady who has frequently made the experiment herself. Nothing can be cheaper and more quickly done.

Making and Using Washing Fluid.—One pound of soda ash, one pound of unslaked lime, four quarts of water. Boil these ingredients together in a saucepan. As soon as boiled, pour off to settle. Soak the clothes overnight, with one-half cup of the solution thrown into the water.

After rubbing the clothes, which will be very easy, put them into the boiler, which must contain soft water. Before putting them into the boiler, add one-half cup of the solution with a few slices of soap to dissolve. Let the clothes boil ten minutes ; take out and rinse.

This method will remove all stains, and beautiful white clothes will appear. It does not rot the goods. A lady has used this preparation for fourteen years, and could not be prevailed upon to use any other. She also mentions several of her friends who think it unequaled. It is not very expensive, for ten cents will buy material for many washes.

Another Way.—Put five quarts of rain water into a kettle, and, when it is hot, add one pound of sal soda and one-half pound of quicklime ; let the whole boil together a few minutes until the sal soda and lime are dissolved, then remove it from the fire, and when it is settled it may be put into bottles.

The night before washing put the clothes soaking. In the morning wring them out and put them boiling, having added about a pint of the fluid to the

boiling water, stirring it together. After they are boiled, it will be found necessary to rub the dirtiest of the clothes, but they come clean much easier from the effects of the fluid.

A fluid made by dissolving saltpeter in soft water is an excellent aid in washing, and not considered by housewives generally as injurious, I believe.

To Remove Mildew from Clothes.—Mix soft soap with powdered starch, half as much salt, and the juice of a lemon; lay it on the part with a brush; then lay the article on the grass day and night till the stain comes out.

Second Method.—Make a very weak solution of chloride of lime in water—about a heaping teaspoonful to a quart of water; strain it carefully, and dip the spot or the garment in it, and if the mildew does not disappear immediately, lay it in the sun for a few minutes, or dip it again in the lime water.

The work is effectually and speedily done, and I cannot find by experiment that the chloride of lime either rots the cloth or removes delicate colors, when sufficiently diluted, and the article rinsed afterward in clear water. If the mildew is on lawn or muslin, wash in hot chlorine water. Spirits of hartshorn is also said to be useful for the same purpose.

Third Method.—After washing the clothes, but before boiling, pin Jamestown weed leaves upon the mildewed spots. Cover the bottom of the boiler with a single layer of leaves, and lay spots next to them. Sour buttermilk and lemon juice are also good.

How to Clean Merino.—Grate two or three large potatoes; add to them a pint of water; let them stand for a short time and pour off the liquor clear, when it will be fit for use. Lay the merino on a flat surface and apply the liquid with a clean sponge till the dirt is completely extracted. Dip each piece in a pailful of clean water and hang up to dry without wringing. Iron while damp on the wrong side. It will then appear almost new.

How to Wash Delaines.—Have the water only milk warm, making a lather of white soap before you put in the dress, instead of rubbing it on the material, and stirring into a first and second tub of water a large tablespoonful of ox gall. Wash fast and then rinse through two cold waters. Into each rinsing water stir a teaspoonful of vinegar, which will help to brighten the colors; and after rinsing hang them out immediately.

When dry enough to iron (still a little damp) bring them in; have irons ready heated, and iron them at once, as it injures the colors to allow them to remain damp too long, or to sprinkle and roll them up in a covering for ironing next day. The best way is not to do colored dresses on the day of the general wash, but to give them a morning by themselves. They should only be undertaken in clear, bright weather.

If allowed to freeze the colors will be irreparably injured. No colored article should ever be boiled or scalded at all. Some colors (especially pinks and light greens), though they may stand perfectly well in washing, will change as soon

as a warm iron is applied to them ; the pink turning purplish and the green bluish.

To Wash Thin Muslins.—Muslin dresses, even the most delicate colors, can be cleaned in a quarter of an hour, without loosing their color. Melt half a pound of white soap in a gallon of water, empty in a washing tub of water ; place near two other large tubs of clean water, and stir into one a quart of bran.

Put the muslin in the suds, turn it over and knead it for a few minutes ; squeeze it out well, but do not wring it, lest it get turned ; rinse it about quickly in the bran for a couple of minutes. Rinse again well for a couple of minutes in clear water. Squeeze out dry, and hang it between two lines. A clear, dry day should be chosen.

To Wash Silk Goods.—Half a pint of gin, four ounces of soft soap, and two ounces of honey, well shaken. Wet a sponge with this mixture and rub the silk, which should be spread upon a table. Then wash it through two waters, in which put two or three spoonfuls of ox gall, which will brighten the colors and prevent them running.

Do not wring the silk, but hang it up to dry, and while damp iron it. The lady who furnishes this recipe says she has washed a green silk dress by it, and it looks as good as new.

To Clean Old Black Silk.—Rub each breadth carefully with a woollen cloth to get the dust from the surface, then mix an equal quantity of strong tea and vinegar, with which the silk is washed by rubbing it with a piece of flannel. It must be made very wet. Smooth the silk, carefully folding it, and in about fifteen minutes iron it on the wrong side with very hot irons. This applies only to black silk, black ribbons, cravats, etc.

Another Way.—Black silks can be renewed by sponging with alcohol, and afterward with a little potato water, and winding them around a roller without ironing. The method of preparing the potato water is this : Pare and slice a good sized potato, and pour about a pint of warm water upon it ; let it stand in a warm (not hot) place for half an hour, and it will be fit for use. Crape veils are renewed by winding them on a board and steaming over boiling potatoes.

To Remove Grease from Silk.—Put French chalk upon the wrong side, allow it to remain twenty-four hours ; then split a common business card, lay the rough side next to the powder and pass a warm flat-iron over it.

Second Method.—Fuller's earth, perfectly dried (so that it may crumble into a powder), is to be moistened, with the clear juice of lemons, and a small quantity of pure pearl ashes or saleratus is to be added. Knead the whole carefully together, till it acquires the consistence of a thick, elastic paste ; form it into convenient small balls and dry them in the sun.

To use, first moisten the spot on the clothes with water, then rub it with the ball, and let the spot dry in the sun after having washed it with pure water, the spot will entirely disappear

Third Method.—A lady writes: "I have cleaned wheel grease from a nice silk thus: Laying the silk on a clean sheet folded to eight thicknesses, I rubbed the greased part with a soft cloth dipped in lard, moving the silk to a new spot frequently.

"After a time the wheel grease all went through, leaving only clean lard. This was then cleaned out in the same way, by rubbing it with some nice soap and alcohol, using a clean cloth to rub with, and frequently changing to a new spot on the underlying sheet. The silk was then laid on a clean cloth, and rubbed dry with a soft cloth. A friend cleaned white Canton crape in this way, and you cannot find a place where it was greased."

Paper Wrappings for Silk.—Silk articles should not be kept folded in white paper, as the chloride of lime used in bleaching the paper will probably impair the color of the silk. Brown or blue paper is better; the yellowish, smooth Indian paper is best of all. Silk intended for dress should not be kept long in the house before it is made up, as lying in the folds will have a tendency to impair its durability by causing it to cut or split. If it must be kept, change now and then the position of the folds.

To Take Creases Out of Silk.—Hard silk should never be wrinkled, because the thread is easily broken in the crease, and it never can be rectified. The way to take the wrinkles out of silk scarfs or handkerchiefs is to moisten the surface evenly with a sponge and some weak glue, and then pin the silk with toilet pins around the selvages on a mattress or a feather bed, taking pains to draw out the silk as tight as possible.

When dry, the wrinkles have disappeared. The reason of this is obvious to every person. It is a nice job to dress light colored silk, and few should try it. Some silk articles may be moistened with weak glue or gum arabic water, and wrinkles ironed out on the wrong side by a hot flat-iron.

To Make Cloth Water-proof.—In a bucket of soft water put half a pound of sugar of lead and half a pound of powdered alum; stir this at intervals until it becomes clear, then pour it off into another bucket, and put the garment therein, and let it be in for twenty-four hours, and then hang it up to dry without wringing it. The rain hangs upon the cloth in globules, but will not penetrate it at all.

Another Way.—Take one-fourth ounce of yellow soap; boil twenty minutes in one gallon rain water; skim, and when cold, put in the cloth; let it soak for twenty-four hours; take it out and hang up to drain, and when it is half dry, put it into a solution of half a pound of alum, quarter pound of sugar of lead, dissolved in four gallons of rain water.

When the cloth has been thoroughly soaked, hang it up to dry. This will not alter the appearance of the cloth, and will resist many hours of rain. Still another way is to coat the cloth with linseed oil, to which a little wax and litharge have been added, and it will become water-proof.

Sizing for Cloth.—Dissolve a little India rubber in boiling oil or turpentine, and add a little of this to thin paste while both are hot. This is the best size for cloth.

Black Coating for Cloth.—Equal parts of yellow ocher and lamp-black; mix with it an equal quantity in bulk of strong, boiling soap suds. Lay on as thick as the brush will spread. In three days finish with black paint.

To Raise the Nap on Cloth.—Soak in cold water for half an hour, then put on a board, and rub the threadbare parts with a half worn hatter's card, filled with flocks, or with a prickly thistle, until a nap is raised. Hang up to dry, and with a hard brush lay the nap the right way.

How to Brush Gentlemen's Clothes.—Have a wooden horse to put the clothes on, and a small cane to beat the dust out of them; also a board or table long enough for them to be put their whole length when brushing them. Have two brushes, one a hard bristle, the other soft; use the hardest for the great coats, and for the others when spotted with dirt.

Fine cloth coats should never be brushed with too hard a brush, as this will take off the nap and make them look bare in a little time. Be careful in the choice of the cane; do not have it too large, and be particular not to hit too hard. Be careful also not to hit the buttons, for it will scratch, if not break them; therefore, a small hand whip is the best to beat with.

If a coat be wet and spotted with dirt, let it be quite dry before brushing it; then rub out the spots with the hands, taking care not to rumple it in so doing. If it wants beating do it as before directed, then put the coat at its full length on a board; let the collar be toward the left hand and the brush in the right.

Brush the back of the collar first, between the two shoulders next, and then the sleeves, etc., observing to brush the cloth the same way that the nap goes, which is toward the skirt of the coat. When both sides are properly done fold them together; then brush the inside, and last of all the collar.

To Dry-Clean Cloth.—Dip a brush in warm gall and apply it to greasy places, rinse it off in cold water; dry by the fire, then lay the coat flat, strew damp sand over it, and with a brush beat the sand into the cloth; then brush it out with a hard brush, and the sand will bring away the dirt. Rub a drop of oil of olives over with a soft brush to brighten the colors.

How to Clean a Coat Collar.—Obtain from drug store some soap-tree bark. Break a piece about two inches square into small bits, and pour over it half a pint of boiling water; let it stand an hour or two, then sponge the collar well with the liquor; a second sponging with clear water will clean it nicely. Both washing and rinsing water should be as warm as for flannel.

To Clean Men's Old Clothes.—Whip and brush thoroughly. Remove grease spots with ammonia, and with alcohol and water, equal parts, diminish the gloss of hard goods.

Dealers in old clothes give the garments a new appearance by use of tobacco.

They put two ounces of common tobacco boiled in half a gallon of water. In the hot decoction they dip a stiff brush, and rub the clothes thoroughly in all directions, no matter what color of cloth. When the liquid is well penetrated, they rub in one direction thoroughly, and suspend the cloth to dry; by this treatment it becomes clean and lustrous, and, singularly, no tobacco smell will remain.

To Renovate an Old Coat.—First clean the coat of dirt and grease, then take one gallon of a strong decoction of logwood, made by boiling logwood chips in water. Strain this liquid, and when cool add two ounces of gum arabic in powder, which should be kept in well stoppered bottles for use.

Then go gently over the coat with a sponge wet in the above liquid, diluted to suit the color, and hang it in the shade to dry. After which, brush the nap smooth, and it will look as good as new. The liquid will suit all brown or dark colors if properly diluted, of which it is easy to judge.

To Revive Faded Black Cloth.—Having cleaned it well, boil two or three ounces of logwood for half an hour. Dip it in warm water and squeeze it dry, then put it into the copper kettle, and boil half an hour. Take it out and add a small piece of green copperas, and boil it another half hour.

Hang it in the air for an hour or two, then rinse it in two or three cold waters, dry it, and let it be regularly brushed with a soft brush, over which one or two drops of oil of olives have been rubbed.

Another Way.—Boil two or three ounces of logwood in vinegar, and when the color is extracted, drop in a piece of carbonate of iron as large as a chestnut; let it boil. Have the coat or pantaloons well sponged with soap and hot water, laying them on a table, and brush the nap down with a sponge. Then take the dye upon the table and sponge them all over with it, taking care to keep them smooth and brush downward.

When completely wet with dye, dissolve a teaspoonful of saleratus in warm water, and sponge all over with this, and it sets the color so completely that nothing rubs off. They must not be wrung nor wrinkled, but carefully hung up to drain. The brownest cloth may be made a perfect black in this simple manner.

To Repair Men's Clothes.—If elbows and knees of coats and pants are stretched into a swelling shape, after all sewing is done lay a damp cloth upon them, fold them up, and let them remain thus an hour. Then lay them on a table; smooth them with the palm of the hand; pull them gently, all ways. Continue this till the swelling is reduced—elbows and knees straight and flat. Then press the garments on the wrong side, finishing those places first.

If a black article of clothing gets rusty, dilute a little ink with warm water, and sponge it well with this—for seams and edges use a pen; button holes often need this treatment. If the shoulders look quite gray take the ink undiluted, and be sure to rub it in well, and then press it.

How to Make a Shirt.—Take an old shirt that is a good fit, rip it to pieces, and cut out the new one by it, baste it together and try it on. After you have got it to fit nicely, unbaste it and cut out a pattern, allowing for the seams and marking all the hems, gathers, etc., by notches, so it will be just right to cut your cloth by.

But few ladies are compelled now to make bosoms, as they can be bought for a trifle more than the linen would cost. Putting the bosom into the shirt is the first thing to be done after it is cut. Double the front of the shirt in the middle, also double the bosom and lay it upon the shirt exactly square and even all around, then cut out a piece one inch wider than the bosom and half an inch shorter.

Unfold shirt and bosom, commence at the top of each side and sew the bosom in place of the piece you cut out. Then lay a plait at the bottom and upon each side, both plaits of a size and large enough to make the bosom set smooth; stitch the bottom across, turn the bosom under and hem it down, it being half an inch too long, having been left so for that special purpose, and saves sewing a tape across as some do.

The object of making a plait in the shirt at the bottom of the bosom is to make the front of the shirt narrow. The back you will at once see needs to be wider than the front, to give freedom to the arms and shoulders; if both sides are of a width the bosom will shrug together and set out beyond the vest in a manner you may have seen, but could not explain.

Line the front of the shirt the whole length and width from the bosom back to the arm size. Some only face a narrow strip just around the arm size, but the best way by far is to line the whole back from the neck down to the bottom of the arm size and the front as before said.

The quickest and easiest way to sew up seams in shirts and all other undergarments is in this wise: Sew up your garment or sleeve upon the right or outside, trim the seam very small, turn and sew up again on the wrong side, and your seam is quickly and neatly finished without felling, which is a branch of sewing most ladies dislike very much to do. The first time sewing the seam, the stitches may be long, if the cotton is strong, but the second time it must be done tight and well, and you will find the seam strong and soft.

To Do Up Shirt Bosoms.—Take two ounces of white gum arabic, put in a pitcher and pour on a pint or more of boiling water, according to the degree of strength you desire, and then, having covered it, let it stand all night. In the morning pour it carefully from the dregs into a clean bottle, cork and keep it for use.

A tablespoonful of gum water should be stirred in a pint of starch made in the usual manner. This will also give to lawns, either white or printed, a look of newness when nothing else can restore them after they have been washed.

Another Way.—Take half an ounce each of white wax, isinglass and

gum arabic, and half a teaspoonful of alcohol, and put them into a gill of boiling water, and after a good shaking, bottle. To a quart of starch add a teaspoonful of the mixture. Starch the linen while wet.

To Make Fabrics Fire-proof.—By using a strong solution of alum for rinsing water it will positively make cottons fire-proof. Mothers who “sit on thorns” at school concerts and exhibitions, watching the dangerous proximity of gossamer dresses to the foot lights, will appreciate this advantage. And so far from injuring the looks of the muslin, there is no other treatment that will so brighten and improve the colors.

How To Iron Clothes.—One who knows by practical experience of what she speaks, says: That the ironing board should have a slip cover, and the same be washed each fortnight, and besides there should be a large piece of thin cotton to lay over starched things to take the first pressure of the iron. This piece must be fine, for coarse cloth will leave the impress of its thread on nice fabrics.

A bowl of clear water, with a clean sponge or soft brush, or worn white rag, must be ready for dampening spots that have dried since folding, or have not ironed smoothly. The table ought to be solid, without leaves, and a high chair should be provided, so that one may sit close to the board, touching it with the waist.

It is just as convenient to iron sitting as standing, if one gets used to it, and most of the fatigue of ironing comes from standing long at a time. A house-keeper who knows how to be good to herself—as every woman ought to be—will have a table for ironing with one side hollowed out, like the cutting boards which seamstresses use in their laps.

To Iron Velvet Ribbon.—Dampen the under side slightly, and draw it backward and forward over a hot stove pipe until the velvet is quite dry. A still better plan—though in winter it is not always as convenient—is to lay a wet piece of cotton cloth on a hot flat-iron placed upside down, and while the steam is rising from it, to draw the under side of the velvet tightly backward and forward over the wet cloth.

To Raise the Nap of Velvet.—Place a dampened towel over the face of a moderately hot flat-iron. Lay the piece of velvet on this immediately, and while the steam is passing through, brush briskly in the direction that will raise the nap; a nail brush will answer the purpose. I have found this method the most effectual of various ones tried.

To Wash Lace.—Wind a large bottle with white flannel, baste on the lace, taking care not to draw it out of shape, and cover with more flannel. Prepare a fine suds, and cleanse the lace by passing swiftly through the water and by squeezing and patting it. Change the water once or twice, then remove the outside flannel and rinse. If starch is used it should be very thin.

To iron, lay the lace upon several thicknesses of flannel, cover with flannel,

and press with a warm iron on the wrong side, *lightly*. If the lace is kept in a box with a little magnesia sprinkled over, it will retain its whiteness for a long time. The magnesia is also good for removing oily substances that may accumulate upon collars from the hair.

To Smooth Ribbon.—Place a moderately hot flat-iron on the ironing board, the ribbon under the iron, and pull it carefully through. If the ribbon is not pulled too fast, and the iron is the right warmth, this will be found to be a much better way than simply rubbing the iron over the ribbon.

To Clean Black Ribbons.—Take an old black kid glove, no matter how old, and boil it in a pint of water for a short time; then let it cool until the leather can be taken in the hand without burning; use the glove wet with the water to sponge off the ribbon.

If the ribbon is very dirty, dip it into the water and draw it through the fingers a few times before sponging with the glove. After cleaning, lay a piece of paper over the ribbon and iron; paper is better than cloth. The ribbon will look like new.

To Wash Ribbons.—If dingy and greasy, rub the yolk of an egg upon them, or French chalk upon the wrong side, and let it dry; then lay it upon a clean cloth, and wash upon each side with a sponge, and press upon the wrong side. If very much soiled, use bran water, and add to the rinsing water a little muriate of tin to set red; oil of vitriol for green, blue, maroon and bright yellow.

To Renew Silk or Ribbons.—Scrape several large potatoes and put a pint of cold water over them. When settled, pour it off; spread your silk upon the table and wet with a sponge a small part of the silk, and iron with a flat just a little warmer than you can handle with your hands bare. If it is too hot it will injure the silk.

To stiffen ribbons or old silk, take a lump of gum arabic about as large as a hickory nut; dissolve it in a half pint of water and dip the silks or ribbons in it, and iron them immediately. If they are soiled they should be washed and dipped in a weak solution of alum water.

To Clean Gold and Silver Lace.—Gold and silver lace may be cleaned by sewing it in clean linen cloth, boiling it in a pint of soft water and two ounces of soap and washing it in cold water. If it be tarnished, apply a little warm alcohol to the tarnished parts.

To Starch Black Calico.—Make a strong tea of fig leaves, and mix the starch with this. Wash the print in three waters and rinse in the fig leaf water. When nearly dry fold the fabric, let it remain so for thirty minutes, and then iron.

How to Wash Tatting.—Get a common stone bottle (a quart porter bottle will do) and sew a piece of thin flannel evenly all over it; wrap the tatting on, carefully tacking each row as flatly as possible to the flannel.

Sew a piece of tarlatan or very thin muslin over it, leaving the tarlatan long

enough to tie firmly, both at the bottom and top of the bottle. Sink the bottle in a large basin of cold water and soak it overnight.

Cut up a piece of white soap, put it in a large stew pan of water with the bottle, and stew for six hours; if the tatting does not look quite clean, rub the bottle a little with the hand and more soap, and stew it again; rinse well in clear, cold water, and put the bottle in the sun or near the fire to dry, when the tatting can be taken off. If it has been tacked on well, and in its proper form, it will be just like new tatting.

How to Do Up Laces.—When one has any fine handkerchiefs, embroidery, or laces, to do up, it is a good way to put them in a broad, earthen basin, in fair, soft water; let them remain three days, then put them in a stone jar, in cold, soft water, rubbing with Castile soap any spots there may be upon them, and setting the jar on the back part of the stove, let the water come slowly to a boil. Then remove and rinse in fair, cold water, in which is the least suspicion of bluing.

Make a thin starch and boil until perfectly clear; a trifle of spermaceti or white beeswax adds a polish. Into this is dipped each article separately, which is then dried sufficiently to iron, being alternately clapped between the hands and spread out to the warm rays of the sun in the summer, or before the blaze of a clear fire—wood is the best—in winter.

Have ready a clean, dry towel, and, as soon as each article is dry enough to iron, lay it in this towel and give it a tight roll. Lay it on baby flannel to iron and have the flat heated as hot as possible without danger of scorching. The heat of the iron should always be tried upon a piece of waste cloth kept for the purpose. In using the iron, the touch should be firm and quick.

A fine linen rag, wet with cold water, should be at hand to rub any article that may have become too dry. Laces require very little starch. A lump or two of white sugar dissolved in a coffee cupful of water will impart all the stiffness they need. Where it is considered desirable to retain the slightly yellow shade of real lace, add a teaspoonful of coffee to the sugar and water.

To Wash Bombazine.—Put a teaspoonful of ox gall to a gallon of suds. Put the clothes through by hand pressure; no rubbing. Rinse in lukewarm water in which a little gum arabic has been dissolved and thoroughly incorporated. Do not wring, but squeeze out the water, and when dry enough press gently with a warm iron upon the wrong side.

To Wash Fine Fabrics.—Laces and fine things should be washed in hot soft water. Well soap them and squeeze and shake out, but on no account rub them. Repeat the squeezing and shaking out till they are clean. Rinse them in some more clean hot water, and well soap them again, and put them into a saucepan with enough hot water to cover them.

Soft water is best, but if that cannot be procured, add a piece of soda—say a quarter of an ounce to half a gallon of water, according to the hardness of

the water. Boil for half an hour. Then wash them out again, and rinse in cold blue water. Hang them on a clothes horse till dry, when they can be starched. Lastly, roll them up in a dry cloth for two hours, by which time they will be fit to iron.

METHODS OF BLEACHING.

To Bleach a Straw Hat.—Scrape stick sulphur with a knife, mix the powder to a mush with water, plaster it thickly over the straw, and place in the sun for several hours; brush off when dry. An easy and effectual plan. Another way is to burn brimstone in a box containing the hat.

To Bleach Fabrics, Etc.—Put a kettle with some lighted charcoal into a close room, or large box; then strew one or two ounces of powdered brimstone on the hot coals. Hang the articles in the room or box, make the door fast, and let them hang some hours. Fine colored woollens are thus sulphured before dyed, and straw bonnets are thus bleached.

To Bleach Cotton Cloth.—Tie a quart of ashes in a cloth; boil in water to make a white lye; put your lye into a tub of hot suds, tie up tightly in a stout piece of cloth, one-half cent's worth of chloride of lime to each yard of cloth you wish to bleach, take two small pieces of boards and rub the lime through the rag. When it is dissolved, use plenty of water and put in your cloth, stirring it often for half an hour, then rinse it thoroughly. Don't be afraid of rinsing too much; if you put your lime into the tub without rubbing it through a cloth to dissolve it, you will surely find holes in your cloth, as there will be small lumps that will not dissolve.

Second Method.—To about sixteen yards, or say half a bolt of cloth, use half a pound chloride of lime. Have the water hot, and make it quite strong of suds before putting in the lime. Be sure the lime is thoroughly dissolved before putting in the goods, for if there are particles of it remaining undissolved they will eat holes through the cloth. Have water enough in the tub to thoroughly cover the cloth, and while it is in, stir it constantly and often lift it to the surface to let it have the air. This must be strictly attended to.

The cloth should not remain in the water more than three-quarters of an hour, and often half an hour will be long enough—the judgment as to time must be used somewhat. Then take out, rinse thoroughly in warm water and dry. This process is often a convenient one to have performed; but for obtaining the real service of the cloth, there is no better way than that of making up the garments from unbleached goods and bleaching them by the natural mode of wearing and washing.

Third Method.—To a pint of water add one ounce of oxalic acid, and use a tumblerful of this to three gallons of water. Stir well while the cloth is in the water, and rinse twice. Some use borax for bleaching by putting a small teacupful of borax into twelve gallons of soft water, and boiling the cloth in the same.

To Bleach Brown Cloth.—Boil the cloth in weak lye, then let it hang on a line or lie upon the grass for a few days. If the sun is hot, sprinkle the cloth twice a day, so as to keep it damp.

To Bleach a Faded Dress.—Wash it well in hot suds and boil it until the color seems to be gone, then wash and rinse and dry in the sun. If not sufficiently white, repeat the boiling, adding a handful of chloride of lime and a gill of vinegar to the water, instead of soap. Good prints and other articles of dress are frequently cast aside because they are faded; but they may again render good service by this mode of bleaching.

To Bleach Forest Ferns.—Gather them after the frost has turned them brown or yellow. Then put them in a solution of chloride of soda (not lime), one-third soda and two water, and let them stand in the sun until white, then rinse them in clear water; flatten then on a piece of glass, carefully wipe them with a soft cloth, and press them between blotting paper. The pressure should be made by placing the blotting paper between the leaves of a book, not with an iron. When dry they are ready for use.

Bleaching Fluid for Washing.—Into a bucket of boiling water put a pound of lime, and let it stand overnight. Next day put over the fire two pounds of sal soda in two gallons of water. Let it simmer until all is thoroughly dissolved; then pour the lime water into the soda water, mix thoroughly, cool and put away in glass, as it will eat holes in stone jars. A half teacupful of this fluid to three pails of water, when clothes are boiled, will make them beautifully clear and white. If any crumbs of lime fall on the clothes they will leave yellow spots.

Another Preparation.—One of the best bleaching and emollient agents that can be employed in washing clothing, is common refined borax pulverized. It should be dissolved in hot water, at the rate of half a pound to ten gallons. A great saving in soap is effected by its use.

To Bleach Beeswax.—Melt the wax and add for each pound two ounces of nitrate of soda, and one ounce of sulphuric acid diluted with nine parts of water. The latter should be added very slowly, while the melted wax is constantly stirred with a glass rod. It is then cooled and set aside after filling the vessel with boiling water. Washing the wax with boiling water until no trace of the acid remains completes the process.

Another Way.—Slice the wax into thin sheets, and pass a string through them, and hang them in a window exposed to the light and sun. When sufficiently whitened, they can be melted and made into any form desired.

HOW TO REMOVE STAINS.

To Take Smoke Stains from Walls.—An easy and sure way remove smoke stains from common plain ceilings, is to mix wood ashes with the whitewash just before applying. A pint of ashes to a small pail of whitewash is sufficient, but a little more or less will do no harm.

To Remove Stains from Broadcloth.—Take an ounce of pipe clay, which has been ground fine, mix it with twelve drops of alcohol and the same quantity of spirits of turpentine. Whenever you wish to remove any stains from cloth, moisten a little of this mixture with alcohol and rub it on the spots. Let it remain till dry, then rub it off with a woolen cloth, and the spots will disappear.

To Remove Red Stains of Fruit from Linen.—Moisten the cloth and hold it over a piece of burning sulphur, then wash thoroughly, or else the spots may reappear.

To Remove Oil Stains.—Take three ounces of spirits of turpentine, and one ounce of essence of lemon; mix well, and apply it as you would any other scouring drops. It will take out all the grease.

To Remove Iron Stains.—The part stained should be remoistened with ink, and this is removed by the use of muriatic acid, diluted with five or six times its weight of water, when it will be found that the old and new stains will be removed simultaneously.

Another Method.—Iron stains may be removed by the salt or lemons. Many stains may be removed by dipping the linen in sour buttermilk, and then drying it in a hot sun; wash it in cold water; repeat this three or four times.

Still Another Method.—Squeeze lemon juice into a cup, add a pinch of salt, and rub the stain in this. Then wash in clear, tepid water. Sponge goods that cannot be rubbed. Lay in the sun until dry. Repeat the application, if necessary, until the stain is removed. With some blacks the matter might be made worse. A piece of the material having iron rust should be tried first.

To Remove Oil Stains from Wood.—Mix together fuller's earth and soap lees, and rub it into the boards. Let it dry and then scour it off with some strong soft soap and sand, or use lees to scour it with. It should be put on hot, which may easily be done by heating the lees.

Another Method.—Pour one teaspoonful of turpentine on the spot and let it remain five or ten minutes, then take one tablespoonful of soft soap and spread over the spot, let it remain a few minutes, then pour on boiling water, scrub with a brush broom, wash and wipe dry—if the grease has not disappeared, repeat the process, or mix together fuller's earth and soap sediment, and rub it into the boards; let it dry, and then scour with soap and sand.

To Remove Stains from Scorched Goods.—If the scorch is not an absolute burn, it may be removed by boiling the fabric in milk, turpentine and soap. To half a gallon of milk use half a pound of soap and half a teacupful of turpentine. Be careful about exposing turpentine to fire.

To Remove Stains from the Hands.—Rubbing the fingers with the inside of the parings of apples will remove most of the stain caused by paring. A few drops of oil vitriol (sulphuric acid) in water, will take the stains of fruit, dark dyes, stove blacking, etc., from the hands without injuring them. Care must, however, be taken not to drop it upon the clothes. It will remove the color from woolen and eat holes in cotton fabrics.

To Remove Ink from Cloth.—Ink may be removed from cotton, silk or woolen goods by saturating the spots with spirits of turpentine, and let it remain several hours; then rub it between the hands. It will disappear, it is said, without injuring either the color or the texture of the article.

Another Method.—The moment you spill ink, take a little milk and saturate the stain; soak it with a rag and apply a little more milk, rubbing it in well; in a few minutes the ink will be completely removed. See page 216.

To Remove Ink from Linen.—A good way to take ink out of linen is to immerse the part that has ink on it in boiling hot tallow. When cool wash out in soap suds, and it is said the linen will be as white as ever.

Another Method.—Many stains will yield to good washing in pure, soft, warm water. Alcohol will remove almost any discoloration. Almost any stain or iron rust, or mildew, may be removed by dipping in a moderately strong solution of nitric acid, then covered with salt, and kept in the sun. This may require to be repeated many times.

To Remove Ink from Common Paper.—Shake well together one pound of chloride of lime in four quarts of soft water. Then let it stand for twenty-four hours, after which strain through a clean, cotton cloth and add one teaspoonful of acetic acid to an ounce of chloride of lime water. Apply this to the blot and the ink will disappear. Absorb the fluid with a blotter. See page 216.

To Remove Ink Stains from Mahogany.—Touch the stains with a feather dipped in a mixture composed of a few drops of niter and a teaspoonful of water. To prevent a white mark being left, rub the spot with a cloth wet in cold water.

Old Ink Stains on Fabrics.—Oxalic acid is probably the best material to use; it is an acid made from sorrel and a natural enemy to ink. Care should be taken to touch to the solution only the inked spot, providing its fabric is colored, as it will also loosen the color. If its color is started, rinse in warm water, then dip into a solution of ammonia about six drops to a quart of water. Go through with the operation rapidly.

Ink also, if washed out or sopped up from the carpet with cold water immediately when it is spilled, can be almost entirely removed. See page 216.

To Remove Kerosene Stains.—To drive it completely from any fabric, from paper, or from wood, it must be heated high enough to form a vapor, when, if pure, it may be completely removed. Heat may be applied to the floor by using flat-iron sufficiently hot, first placing a piece of paper over the spot. It may be that after the oil is driven from the surface by heat, the stain will reappear; some of the oil remaining in the wood will be brought to the surface by capillary attraction. In such a case it will be necessary to repeat the operation as often as the stain appears.

To Remove Lime Spots.—Lime and acids do not really stain, but spot by the removal of color, and ammonia is the best remedy. A tablespoonful of ammonia in one gallon of water will often restore the color of carpets, even if dissolved by acid or alkali. If a ceiling has been whitewashed with the carpet down, and a few drops should fall, this will remove it.

To Remove Apple Stains.—Hold the stained cloth over an empty vessel, and pour boiling water on it slowly, filtering through. If this fails to remove the stains, dissolve a few grains of oxalic acid in half a pint of cold, soft water and dip the cloth in it. A few dippings, I think, will remove the stains. A solution of it kept in a bottle for toilet use is convenient in freeing the hands of stains. Lemon juice and salt exterminate ink spots and other stains in white goods.

To Remove Walnut Stains.—Rub with slices of sour apple or pear; the cleansing power being due, it is supposed, to the presence of the acetic acid. If the stains be at once thoroughly washed in fresh water, without using soap, they may be made to disappear almost entirely; soap is unadvisable, since its alkali acts as a mordant and fixes the color. The use of clay with water is very good. The clay scours the color off.

To Take Fruit Spots from Fabrics.—Let the spotted part of the cloth imbibe a little water without dipping, and hold the part over a lighted common brimstone match at a proper distance. The sulphurous acid gas, which is discharged, soon causes the spots to disappear. Or, wet the spot with chlorine water.

Another Way.—Fruit stains may be removed from linen by first pouring hot water on the spot, then wetting with hartshorn or oxalic acid. The proportions of either are a teaspoonful to a teacup of water.

To Remove Grass Stains.—Boiling water will remove the color. Pour boiling water through the stain and it sets the green coloring matter loose, rinsing it away. Grass stain, after washing with soap suds, makes a dirt-colored mark, and remains an ugly blot on children's white clothing.

To Take Stains out of Silver Plate.—Steep the plate in soap lyes for the space of four hours; then cover it over with whiting, wet with vinegar, so that it may stick thick upon it, and dry it by a fire; after which, rub off the whiting, and rub it over with dry bran, and the spots will not only disappear, but the plate will look exceedingly bright.

To Remove Tea Stains.—Mix thoroughly soft soap and salt—say a tablespoonful of salt to a teacupful of soap; rub on the spots, and spread the cloth on the grass where the sun will shine on it. Let it lie two or three days, then wash. If the stains are not all out, they will appear in the second washing. If the spots are wet occasionally while lying on the grass, it will hasten the bleaching.

To Remove Stains from Pickling.—If you have been pickling or handling any acid fruit and have stained your hands, wash them in clear water, wipe them lightly, and while they are yet moist strike a sulphur match and shut your hands over and around it, so as to catch the smoke, and the stains will disappear.

To Remove Stains from Muslin.—If you have stained your muslin or gingham dress, or your white pants with berries, before wetting with anything else, pour boiling water through the stains and they will disappear. Before fruit juice dries it can often be removed by cold water, using a sponge and towel if necessary.

To Remove Acid Stains.—Stains caused by acids may be removed by tying some pearlash up in the stained part; scrape some soap in cold soft water, and boil the linen until the stain is gone.

DYES AND DYEING.

To Color Blue.—There are very many different modes for dyeing blue; the most of them, however, embody as chief materials either woad, aniline or indigo. Woad contains coloring material so very similar to that of indigo, and so much less in quantity, that the latter is almost always used, or was before the advent of aniline. Almost every farmer's wife and daughter knows how to make the old fashioned blue dye, yet all of them do not know how to make it *right* or how to treat the fabric to obtain the best results.

The Saxon Blue.—The Saxon blue is very pretty and permanent, and not difficult to make. The dye for silk and wool is made in small amounts by dissolving one ounce indigo in four ounces concentrated sulphuric acid; to this solution add one ounce of dry carbonate of potash, then dilute the whole with eight times the weight of soft water. This solution is called sulphate of indigo, and is ready to be used as soon as the fabric is prepared for it.

To prepare the clothes—or whatever is to be colored—for the dye, wash clean and boil in a solution made by adding to water for every two pounds of fabric, five ounces of alum and three ounces of tartar; use enough water to cover the cloth. After boiling a short time drain out, and put into a water bath, to which

has been added enough of the sulphate of indigo to make the shade you desire, and boil until color is well taken.

The best way is to use no more water for the bath than is required to cover the fabric; heat it up, add the sulphate of indigo, and obtain the right strength by testing it with a small piece of cloth before the articles to be colored are put in. After the required shade is obtained, rinse, stretch and iron the usual way.

Common Blue Dye.—A common blue dye for woolen goods is made by powdering fine half an ounce of Spanish indigo, and pouring upon it half a pound of oil vitriol, stir well together, add a lump of pearlash the size of a pea, and as soon as fermentation is ended, bottle, and it will be fit for use in twenty-four hours. Make the dye to suit the fancy by putting the solution in warm water. Wash the articles to be colored well, and after remaining in the warm dye long enough to get the desired shade take out the fabric and dry it, then wash in lukewarm suds, rinse, etc.

Another Formula.—Dissolve two tablespoonfuls of copperas in four gallons of water; wet the goods in warm suds, and let them remain ten minutes in the copperas water; dissolve fifteen cents' worth of prussiate of potash in four gallons of water; put the goods into it and let them remain five minutes; then remove, and add to the potash water one and a half tablespoonfuls of oil of vitriol; then put the goods again into the dye, and let them come to a boil; dry in the sun.

Permanent Blue for Wool.—Take two ounces of the best indigo, in fine powder, sufficient warm water, and add six pounds of wool in the grease; put the whole into a kettle large enough to contain all the wool to be dyed. As soon as the requisite color is obtained, let the wool be well washed and dried. The liquor remaining may be again used to produce lighter blues. The color will be as beautiful and permanent as the finest blue produced by woad, and the wool, by this method, will lose less in weight than if it had been previously scoured.

Blue for Cotton and Linen.—A good dye for these is made of one ounce each of indigo (Spanish is the best) and sulphate of iron, and two ounces of quicklime; dissolve in water and treat very similar to the mode given for dyeing silk and wool.

Shades of Color from Prussian Blue.—Impregnate each parcel of silk to be dyed with a different proportion of the oxide of iron by immersing it in a solution, the strength of which has been regulated accordingly. For the deeper tones of color employ the acetate, and for the others the chloride or sulphate.

After having properly rinsed (in separate water) each parcel, it is to be dipped into distinct baths of the prussiate of potash, the quantity of which has been made to correspond with the quantity of oxide of iron previously united to it.

With these precautions all the desired shades may be obtained. Those which

are light and have a greenish cast should be well washed in river water, which will soon produce the blue in its purity. If this does not happen, a very weak solution of muriatic acid will produce the effect to a certainty.

Aniline Blue.—Aniline I prefer to all other materials for coloring, and it is easily prepared. Blue aniline comes in crystals, and in this state has a very rich, purple shade, and is generally soluble only in alcohol, at least it is best to always use alcohol to cut the crystal. Dissolve two drams of aniline in four ounces of alcohol and bottle up; this amount of the solution is enough to make two gallons of dye.

After the fabric has been prepared for coloring by washing clean, first put into the amount of water used for the bath enough sulphuric acid to give it a sour taste, then add the solution in amount as above directed or to obtain desired shade; put in the cloth or yarn and heat gradually until it boils. Make the rinsing water a little sour with sulphuric acid; it is better than alum, at least for making blue permanent. It should be used only for wool and silk.

Cotton or linen goods should never be put into any dye containing sulphuric acid, for it will rot the fabric, but it has no injurious effect upon silk and wool. To color cotton or linen, leave out the acid and use a little alum, but a good color cannot be insured.

To Dye Silk Blue.—Silk is dyed light blue by a ferment of six parts of bran, six of indigo, six of potassa, and one of madder. To dye it a dark blue, it must previously receive what is called a ground color; a red dye stuff, called archil, is used for this purpose.

To Dye Old Dresses Black.—For four pounds of goods take two ounces of copperas and eight ounces of the extract of logwood, or, if you prefer instead, three pounds of logwood chips. Put each separately into twelve quarts of water, the logwood in an iron vessel, the vitriol in brass; bring both to a boiling heat, dip the cloth into the vitriol water first, then in the logwood water, and alternately from one to the other till it has been dipped in each three times. Then dry, wash in strong suds, rinse in cold soft water, and press on the wrong side while damp. This color does not rub off nor fade, and is good for silk, cotton, or lace, but better for wool.

To Dye Carpet Rags Black.—A nice black may be made by soaking logwood chips in warm soft water one day to extract the strength; pour off the liquid and put in the rags or cloth and soak them thoroughly, turning often; after well saturated with dye take out the goods and air them. Add an ounce of copperas to the solution, and when dissolved put in the rags, raising and turning them every few minutes. After dyeing enough, hang them out, and when dry wash in suds and sweet milk; then rinse and you will have a color to suit.

To Dye Woolens Black.—Take of nut gall and sulphate of iron each five parts, logwood thirty parts, for every one hundred parts of cloth by weight,

Prepare nut gall separate in decoction and boil cloth two hours in this; then two hours in bath composed of the sulphate of iron and logwood. Keep up to a scalding heat, but do not allow it to boil. Frequently lift the goods to allow them to air. A little acetate of copper added to the last bath will tend to strengthen the color.

To Dye Chip and Straw Hats Black.—Put in a boiling bath of logwood for four hours. Remove and give an airing; add a little copperas to the solution, and repeat the boiling, and allow the liquid to cool down with hat in. After drying, dress over with a sponge moistened with sweet or olive oil. Use but little oil and dress both sides, and press into shape.

Dyeing Silks Black.—The substances most commonly employed to give a black color to fabrics are red oxide of iron, sulphate of iron, copperas, tannin, bichromate of potassa and logwood. These substances have a strong affinity for each other, and when combined assume a deep black color, not liable to be destroyed by the action of air or light.

Logwood is usually employed because it communicates luster, and adds considerably to the fullness of the black. The dye for silk is prepared the same as that for wool. It is, however, capable of combining a great deal of tan, and the one using a dye can govern the matter to suit themselves. The sulphate of iron can be dissolved in double its weight of cold water, three-fourths its weight of hot or boiling water, but is insoluble in alcohol.

To Dye Silk Stockings Black.—These are dyed like other silk or woolen garments. At first they will look like an iron gray; but to finish and black them, they must be put on wooden legs, laid on a table and rubbed with the oily rubber or flannel, upon which is oil of olives, and then the more they are rubbed the better. Each pair of stockings will require half a tablespoonful of oil, at least, and half an hour's rubbing, to finish them well. Sweet oil is the best in this process, as it leaves no disagreeable smell.

Butternut Bark Black Dye.—Boil a large iron kettle full of butternut bark for four hours; take out the bark, put in a spoonful of copperas. If you wish a deep black put in more copperas—too much rots the goods. While the dye is boiling put in the goods and keep stirring, and once every few minutes lift the goods with a stick into the air, then put them under. And so on, keep watching and moving them till you get the shade required. If left folded or packed too tight they will be spotted.

To Dye Wool a Chrome Black.—Having cleaned the wool with soap and cream of tartar, take four ounces each of bichromate of potash and crude tartar to a kettle of water; put in the merino, boil for forty minutes, and after cooling, immerse in a bath made from four ounces of logwood chips with one-fourth of fustic chips to a kettle of water.

To Dye Cotton Yellow.—Half a pound of sugar of lead dissolved in hot water, one-fourth pound of bichromate of potash, dissolved in cold water,

in wood ; dip first in one, then the other, until the color suits. For orange, dip the above in strong lime water.

Another Formula.—Wet six pounds of goods thoroughly ; and to the same quantity of water add nine ounces of sugar of lead, and to the same quantity of water in another vessel, add six ounces bichromate of potash. Dip the goods first into the solution of sugar of lead and next into that of the potash, and then again into the sugar of lead. Wring out dry, and afterwards rinse in cold water.

Yellow for Carpets.—A lady writes the author of this work, that there is nothing nicer to dye with than those spikes of yellow flowers that grow along old fences so abundantly, the golden rod. Gather only the flowers, boil them in a brass or copper kettle, skim out all the flowers and boil the goods half or three-fourths of an hour, stirring frequently. To set the color use alum water, but not until after the goods have dried.

Another Formula.—Take a half bushel of the inside bark of apple trees, cut into small pieces ; place it in a wash boiler ; fill it three-fourths full of soft water, and let it boil eight hours ; dissolve three ounces of alum in one gallon warm water ; wet the goods with it, and wring out and place loosely in the dye ; stir them round well, and after they have boiled five minutes hang out to dry in the sun. This will make a fast color in either wool or cotton.

To Dye Golden, Chrome Yellow.—Heat till boiling, stirring all the time, eight and a half ounces sugar of lead, sixteen and a half ounces litharge, three gallons of water. Keep boiling about ten minutes ; leave to settle, decant, and while warm handle carefully in it the bleached cotton.

When the cotton is thoroughly impregnated with the subacetate of lead of the bath, dry it by a gentle heat, and handle it in a bath of eight and a half ounces bichromate of potassa and four ounces of nitric acid. Wash well with warm water. Afterwards dip it into a bath of two drams saffron to one quart of strong alcohol, until the desired tint is acquired. This is for cotton goods.

To Color Green.—To four pounds of fabric take one and one-half ounces oxalic acid, two ounces of Prussian blue ; let each soak overnight in one quart of rain water, then put together in as much warm rain water as you want to color with. Put in the fabric and let it be in twenty minutes. Wring out and dip in the following yellow dye :

Take six ounces of sugar of lead, four and a half ounces of bichromate of potash ; dissolve in a pint of hot rain water. Take as much hot rain water as you want to color with. Dip first in the lead, then in the potash several times. Rinse in cold rain water. Use tin or copper—no simmering is needed. The first makes a blue, the last a beautiful yellow, and both a durable green.

Another Formula.—Take two pails and put six quarts of cold or lukewarm water in each ; into one of them put three ounces of sugar of lead, into the other six ounces bichromate of potash, and let it thoroughly dissolve ; then

take five pounds of white fabric and dip into the lead water first, then in the other, then back and forth till the color suits. It will make a beautiful yellow. Then make a strong bluing water with two or three bottles of liquid bluing and dip in it, and you will have a very pretty green. If you prefer, you can dissolve four ounces of Prussian blue in a gallon of soft water. Immerse the yellow goods thoroughly and rub them until colored to suit the taste.

Aniline Green for Straw.—Straw, in a manufactured condition, immortelles, grasses, etc., may be very easily colored with aniline green, as follows: Place the articles in boiling water for ten to fifteen minutes, and allow the whole to cool; in the meantime, mix together ten quarts of water and 450 grains chloride of lime, and add 450 grains of crystallized carbonate of soda, and then immerse the straw half an hour in the clear liquid obtained by allowing it to settle.

Move about the articles thus bleached, in a bath of 450 grains of hydrochloric acid in ten quarts of water for from five to ten minutes, and color the well rinsed straw by agitating it in a bath of a clear solution of aniline green, of about 100 degrees, in a wooden vessel. For the preparation of aniline crystals see "Aniline Blue," page 594.

To Color Woolen Bright Red.—For five pounds of cloth take seven and a half ounces ground cochineal, ten ounces cream of tartar, and one large wine glass of muriate of tin; place the cochineal in three gallons of boiling rain water. After boiling five minutes, add the other ingredients; then throw the goods in and handle them for three quarters of an hour, to give them an even color. Wash in clean water and dry.

To Color Cotton Red.—If the cotton be first passed through a weak solution of acetate of alumina and then dried at a high temperature, afterward washed, next treated with a hot decoction of madder and again washed, it will be found to have received a fine red, which is fixed so as to resist the action of air, light and water.

To Color Fabrics Madder Red.—To every eight pounds of woolen yarn or cloth take four pounds of madder, half a pound of alum, half a pound of cream tartar. Soak the madder in warm water overnight. Dissolve the alum and cream tartar in soft water, boil five minutes and skim it. Wet the articles to be colored in strong soap suds, and boil three hours in the alum and tartar water; wring out and air them.

Now put the articles in the madder; have it warm over a slow fire, keep stirring for three hours; during that time wring and air them two or three times and note the time required for airing, as they must be in the dye three full hours or the color will fade; wash thoroughly in soap suds, then wring out the articles.

While airing and drying they should not be allowed to freeze. To save the madder after wringing out to air, shake the articles over a tub and return the

chips to the dye. After coloring the above, the madder will color old cloth very well. Use a brass kettle for dyeing.

Another Formula.—For two and a half pounds woolen yarn, take three-fourths of a pound of alum, one quart of bran and one pound of madder. Soak the madder overnight in strong vinegar, enough to wet it. Never use any but the best cider vinegar. Dissolve the alum in sufficient water to cover the yarn, and boil the yarn in the solution for two hours; then take out the yarn and throw away the water.

Boil the bran with two gallons of water, and strain; add the liquor to the madder, put it in the kettle with soft water enough to cover the yarn, and bring the whole to a scalding heat; then put in the yarn, keep hot, but do not let it boil nor simmer, for an hour, turning the yarn frequently. Then take out the yarn, and rinse immediately in cold water. The kettle used should be a bright brass or copper one, and the yarn, before coloring, must be perfectly clean.

To Dye a Silk Shawl Crimson.—Take about one tablespoonful of cudbear, put it into a small pan, pour boiling water upon it, stir and let it stand a few minutes, then put in the silk, and turn it over a short time, and when the color is full enough take it out; but if it should require more violet or crimson, add one or two spoonfuls of purple archil to some warm water, and dry it within doors. To finish it, it must be pressed.

To Dye Woolens Crimson.—For crimson, put one-fourth of a pound of cudbear into a gallon or two of strong soap suds. Wash the goods in clean soap suds, put them without wringing into the dye and keep hot in a brass kettle over the stove until the desired shade is obtained.

Cochineal Dye.—One ounce of cochineal, two ounces solution of tin, and one ounce cream tartar; put in a clean brass kettle, with four quarts of pure rain water; let it simmer till all the ingredients are dissolved; then put in one pound of clean yarn; let it simmer half an hour, stirring continually, handling it in the air a few minutes; then wash it in clean soap suds. It will not fade.

To Dye Linens and Cottons Scarlet.—The cloth is first impregnated with oil, then with galls, and lastly with alum. It is then boiled for an hour in a decoction of madder, which is commonly mixed with a quantity of blood. After the cloth is dyed it is plunged into a soda lye, in order to brighten the color. The red given by this process is very permanent, and when properly conducted it is exceedingly beautiful.

To Dye Woolens Scarlet.—Wool may be dyed scarlet by first boiling it in a solution of murio-sulphate of tin, then dyeing it pale yellow with oak bark, and afterward crimson with cochineal, for scarlet is a compound color, consisting of crimson mixed with a little yellow.

Second Method.—For one pound of cloth or yarn, mix in warm water half ounce cream of tartar and one ounce pulverized cochineal; add two ounces muriate of tin. Stir until it scalds, then put in the cloth or yarn.

Third Method.—Dip the cloth in a solution of alkaline or metallic salt, then in a cochineal dye, and let it remain some time, and it will come out permanently colored.

Fourth Method.—Half a pound of madder, half an ounce cream tartar, one ounce of marine acid to a pound of cloth—put all together, and bring the dye to scalding heat. Put in your materials and they will be colored in ten minutes. The dye must be only scalding hot. Rinse the goods in cold water as soon as they come from the dye.

To Dye a Silk Shawl Scarlet.—First dissolve two ounces of white soap in boiling water, handle the shawl through this liquor, now and then rubbing such places with the hands as may appear dirty, till it is as clean as this water will make it. A second, or even a third liquor may be used, if required. The shawl must be rinsed out in warm water.

Then take one-half ounce of the best Spanish annatto and dissolve it in hot water; pour this solution into a pan of warm water, and handle the shawl through this for one-quarter of an hour; then take it out and rinse it in clean water.

In the meanwhile dissolve a piece of alum of the size of a chestnut in warm water, and let the shawl remain in this half an hour; take it out and rinse it in clear water. Then boil one-fourth of an ounce of the best cochineal for twenty minutes, dip it out of the copper into a pan, and let the shawl remain in this from twenty minutes to half an hour, which will make it a full blood red.

Then take out the shawl, and add to the liquor in the pan one quart more of that out of the kettle, if there is as much remaining, and about one-half a small wineglassful of the solution of tin; when cold, rinse it slightly, but in pure, soft water.

To Dye Cotton Brown.—One pound of catechu and four ounces of blue vitriol, dissolved in four gallons of water and strained. Have the goods wet when put in the dye. Keep in an hour, stirring constantly; take them out to air. Then dissolve four ounces of bichromate of potash in hot water enough to cover the goods. Dip until the color suits. This will color fifteen or twenty pounds of fabric. Do the coloring in brass or copper.

To Dye Silks and Satins Brown.—Fill the kettle with river water; when it gently boils put in a quarter of a pound of chipped fustic, two ounces of madder and one ounce of sumac. These should boil at least from half an hour to two hours, that the ingredients may be well incorporated. The kettle must then be cooled down by pouring in cold water; the goods may then be put in, and simmered gently from half an hour to an hour. If this color should appear to want darkening or saddening, a small piece of green copperas may be used; rinse in two or three waters, and hang up to dry.

To Dye Stone Color.—For a stone color, to one pound of fabric use three tablespoonfuls of good green tea in sufficient soft water to immerse the

cloth and boil thoroughly; strain and add a piece of copperas as large as a chestnut, then put in the goods and boil a short time.

To Dye Slate Color.—One paper of ink powder, one quart of vinegar, sufficient water to wet the articles well. Done in brass.

To Dye Silk Lilac.—For every pound of silk take one and a half pounds of archil, mix it well with the liquor; make it boil a quarter of an hour, dip the silk quickly, then let it cool, and wash it in river water, and a fine violet or lilac, more or less full, will be obtained.

To Dye Copper Color.—If you want to color some carpet rags a copper color, take some last leached lye, put in four ounces of copperas for six quarts of lye, immerse white rags, and boil twenty minutes; wash good and dry. This makes a pretty color, and it wears well.

To Dye Rose Color.—One dram of rose aniline is dissolved in half a teacupful of alcohol to make the foundation for color. Put this in half a pailful of warm, soft water. Wring the goods out of warm water and put into the dye for five minutes, lifting the fabric frequently. Let them dry before washing, and use but little soap. The color is very brilliant, and it is said to be permanent.

The strength of the dye is very quickly taken up, therefore it is best, when practicable, to put all the articles to be colored in at once; when not practicable, save out some of the aniline to add before putting in the second quantity. Before putting the cloth into the dye, be sure all the aniline is dissolved. If any crystals are left undissolved, they will cause bright green spots on your goods wherever they touch.

To Dye Purple.—Silk is first dyed crimson by means of cochineal, and then dipped into the indigo vat. Cotton and linen are first dyed blue, and then dipped in a decoction of logwood; but a more permanent color is given by means of oxide of iron.

To Dye Orange Color.—Wool may be dyed orange by first coloring it scarlet and then putting it in a yellow bath.

To Dye Silk Stockings Flesh Color.—Wash the stockings perfectly clean in soap and water, then rinse them in hot water, put three tablespoonfuls of purple archil into a wash hand basin half full of hot water; put the stockings in this dye water, and when of the shade called half violet or lilac, take them from the dye water, and slightly rinse them in cold; when dry hang them up in a close box in which sulphur is burnt; when they are evenly bleached to the shade required of flesh color, take them from the sulphuring box and finish them by rubbing the right side with a clean flannel. Satins and silks are done the same way.

To Dye Olive Color.—By combining red, yellow and blue, olive color is produced. Cotton and linen receive an olive color by being passed through a blue, yellow and then madder bath.

To Brighten Colors.—Soda in the rinsing water will clear up and intensify almost any blue and purple. Vinegar will do the same for pink or green calicoes. It is said that a strong decoction of common hay will preserve the color of French linens and lawns.

To Set the Color of Cotton Dresses.—Take a large, double handful of bran, put it in a saucepan and set it over the fire, allowing it to boil thoroughly in a quart of water; when thoroughly boiled, strain the bran and throw the water into that in which you are about washing your lawn or chintz dress. Let the dress soak for an hour or so in it before washing. Instead of starch, use a weak solution of glue water, and iron on the wrong side.

To Dye Furs.—Take lye that will bear up an egg. To one gallon of lye add two quarts soft water; heat in an iron kettle. Take one ounce of acetate of lead, one ounce of sulphate of iron, seven ounces litharge; pulverize the ingredients and dissolve one at a time in the lye. When the fluid is blood warm, put in the furs a few moments only, then air them and dip into strong vinegar, then slick them off and hang up to dry. Hides should always be well handled. The dye can be made stronger by adding more of the ingredients, and brushing on if not dark enough.

Variegated Cotton Thread or Yarn.—Cotton thread or yarn may be dyed in two or three colors by covering some parts with parchment paper, tightly wound, and thin tin or lead foil, holding the latter in place by binding threads. If tied sufficiently tight when the skeins are introduced into the dye bath, the protected parts remain white; and by protecting the dyed portion, and unwrapping the white portion, another color may be applied.

Preserving the Color of Dresses.—The colors of merinos, mousse-laine delaines, chintzes, printed lawns, etc., may be preserved by using water that is only milk warm; make a lather of white soap before you put in the dress instead of rubbing it on the material, and stirring into a first and second tub of water a large tablespoonful of ox gall. The gall can be obtained from the butcher, and a bottle of it should always be kept in every house.

No colored articles should be allowed to remain long in the water. They must be washed fast and then rinsed through two cold waters unless woolen, then in warm water. Into each rinsing water stir a teaspoonful of vinegar, which will help to brighten the colors; and after rinsing hang them out immediately.

Indigo for all Fabrics.—Indigo has a very strong affinity for wool, silk, cotton and linen. Every kind of cloth, therefore, may be dyed with it without the assistance of any substance to set with whatever. The color thus induced is very permanent.

Setting Colors.—Some mordants modify the color; thus alum brightens madder, giving a light red, while sulphate of iron darkens it, giving a purple. It will be well to observe these facts when coloring.

MANUFACTURING STARCH.

To Make Potato Starch.—Housewives usually much prefer to purchase starch than to make it; but sometimes circumstances are such that it would be convenient to understand the methods of obtaining this material from vegetables and grain. It may be made from both potatoes and wheat. To make it from the former, wash the potatoes very clean, grate fine, wash as much as possible, and strain the whole through fine muslin, using plenty of water.

Let the starch settle to the bottom of the vessel until the water becomes clear and free from a white cloudiness; then pour off the water carefully, and you will find the starch in a hard mass at the bottom of the vessel; there will most likely be a little slime and impurity on the surface of the starch; this must be carefully removed and the surface of the starch rendered clean.

When the starch is well cleaned, stir it up again in pure fresh water, and let it settle again. When the water is clear, pour it off, and your starch will be as pure as driven snow; if it should not be, wash it up again.

When quite bright and clean, take the starch out, make it up into small parcels with the hands, or pour it into cotton bags containing about a pint and slightly tapering, until the water has all drained out of it; then turn it out of the molds, cut it into pieces about three inches square, and set them on new, clean, dry bricks; the bricks will absorb all the remaining water.

Let them remain on the bricks until the starch loses all appearance of wetness; then place it in the sun, where there is a good current of dry air, and it will fall into crystals, more or less perfect, and will then keep any reasonable length of time for use.

To Make Wheat Starch.—This is made as follows: Take a quantity of the best wheat, soak it in water until soft, then crush it on a smooth board until all the grains have burst. Do this little by little; the wheat must be quite soft, so as to yield its substance when pressed; it will be quite sour and offensive, and yet it is not at all unwholesome.

When all is crushed, let it remain mixed with water in a thick state, like cream, until it is quite sour. Then wash it in small portions at a time, in a very fine sieve; the starch will all go through with the water, and the bran may be thrown away. When all is done, give it a good stir up in the vessel, and then let it rest; the starch will all go to the bottom in hard cake.

When this has taken place, which will be in about twelve hours, draw off the water through holes in the sides of the vessel, taking care not to disturb the contents, and also taking care not to go below the clear; when the water is all off, you will find all the gluten and impurities of the wheat in a thick coating on the starch.

This substance is removed from the surface of the starch, and the surface

washed off; the starch is then roused or mixed up with fresh water, and allowed to settle and again cleaned off.

When bright and clean and sweet, the starch must be taken out and placed in cotton bags, as in making potato starch; the water then runs off, leaving the starch so hard that it will turn out of the mold, and the cloth being removed the starch may be cut into cakes, and dried in the sun; it will fall into crystals, and is then fit to be put away for use. If the starch does not come pure and nice, it may be known that the muslin sieve was not fine enough.

Another Formula.—Another way to make wheat starch is to have the wheat ground, but not bolted. Put it to soak in plenty of water and let it ferment; then put in thin bags and squeeze them until all of the milky substance is forced out and nothing but the bran left. If you choose, the bran may be soaked and pressed again. Strain the white fluid through heavy cloth like a blanket; let the starch settle and pour off the water carefully. Add more water, stir up, and allow to settle again. Repeat the pouring off, and continue these operations until the starch is white and solid. Cut into cakes and dry on plates in the sun.

SOAPS AND SOAP MAKING.

To Make Soft Soap.—The failures in making good, soft soap may generally be attributed to either poor ashes, or lack of getting right proportions of lye and grease. Soft soap sometimes appears to be good when put up, but changes entirely after standing a few days. The last trouble usually arises from getting the soap too strong and diluting with water. If very strong, it will be thin and dark, and by adding cold water and thoroughly stirring, the color is changed many shades lighter and the mass thickened, giving it the appearance of a number one article, when in reality it is very poor.

The Ash Leach.—Hickory ashes are the best for soap making, but those from sound beech, maple, or almost any kind of hard wood, save oak, will answer well. A common barrel set upon an inclined platform makes a very good leach, but I must prefer one made of boards set in a trough in V shape, for the strength of the ashes is better obtained, and it may be taken to pieces when not in use and laid up.

First, in the bottom of the leach put a few sticks; over these spread a piece of carpet or woolen cloth, which is much better than straw; put on a few inches of ashes, and from four to eight quarts of lime, according to size of leach. Moisten and tamp down well, the firmest in the center. By moistening you will not have to wait half a day for the lye to start.

It is difficult to obtain the full strength of ashes in a barrel without removing them after a day's leaching and mixing them up and replacing. The top should be first thrown off, and new ashes added to make up the proper quantity. Use boiling water for second leaching.

Boiling for Soap.—Take about four gallons of weak lye and boil up thoroughly with twelve pounds of clear grease; put in a piece of alum the size of a chestnut, then add the strong lye as it is obtained, keeping a slow fire and stirring often, until you have a barrel of soap. After boiling the grease and four gallons of lye together, it may be put in a barrel and the lye added there, which will form good soap if frequently stirred; but the heating process is better when weather and time will permit the work to be done.

Soft Soap with Potash.—Heat soap grease up in weak lye, but do not boil. After grease is well eaten, fill kettle with water, let it stand until the grease rises in a crust at the top; use this for the soap by adding to each ten pounds of grease six pounds of potash. These quantities will make half a barrel of soap. Dissolve the potash and strain the lye into the place where the soap is to be kept. Melt the grease and add it, stirring briskly. Water, of course, is used to make the quantity half a barrel. Stir several times a day until good soap is formed.

Another Method.—To thirteen pounds of potash use twenty pounds of grease and three-fourths of a pound of resin. This quantity will make a barrel of soap. Keep the grease tried out and strained so as to be ready for use when the requisite quantity is gained. Select the gray looking potash, put it into the soap barrel, pour on it hot soft water to facilitate dissolving; when softened put in the grease, reserving two or three pounds to melt the resin in; keep adding hot water till it stirs readily, and when nearly to the top put in the melted resin and fat.

This soap is said to be good and strong, and that it will keep any length of time and be free from insects. If too strong add a third of soft water to it. Avoid dark potash, as it is apt to stain the clothes in washing.

Cheap Hard Soap.—Into a kettle put eight gallons of water, two pounds of clean unslaked lime, and six pounds of soda ash; when it is boiling hot strain it and return it to the kettle, then add twelve pounds of clean grease. Let it boil slowly three hours, then put out the fire and let it get entirely cold. Remove the hard cake that will form without touching the hands to it. Put this in a clean kettle, add one pound of borax, pounded fine, and let it melt, stirring it well together, and when hot pour it into molds that have been previously well soaked in water. Set them in an airy place, not in the sunshine for the first day or two, as it would cure them out of shape; afterward dry perfectly, and then pack away in a dry place. The liquid remaining in the kettle is strong enough to make another lot by adding four pounds of grease, but the soap produced is not quite equal to the first.

Second Formula.—To make common hard soap, put into an iron kettle five pounds unslaked lime, five pounds sal soda, and three gallons of soft water ; let it soak overnight ; in the morning pour off the water, then add three and a half pounds of grease, boil till thick, turn into a pan until cool, and cut in bars.

Third Formula.—Take six pounds of sal soda, six pounds grease and three pounds quick lime. Thoroughly mix the soda and lime in four gallons of water, pour off from the sediment, put in the grease and boil twenty minutes, pour off, and before entirely cold cut in bars.

Fourth Formula.—Five pails soft soap, two pounds salt and one pound resin. Simmer together, and when thoroughly fused, turn out in shallow pans, so as to be easily cut.

Labor Saving Soap.—Dissolve a quarter of a pound of lime in a gallon of cold water, then take off the clear, dissolve half a pound of sal soda in a quart of water, and mix it with the clear lime water. One pound of brown soap dissolved in a gallon of water is then to be added to the clear liquor formed with sal soda and lime water, and this forms the soap. This is excellent for boiling white linen ; it removes all grease that is in it, because it contains an excess of caustic lye.

Concentrated Lye Soap.—Put one pound of concentrated lye into one gallon of boiling water, let it stand ten or twelve hours, then add another gallon of water and heat up to a boil, and add four pounds of clear melted grease ; put in the grease slowly, and stir briskly. Let it boil slowly for about half a day, then add four quarts of hot water in which has been dissolved two tablespoonfuls of borax, four of resin and one teacupful of salt. Cook an hour longer, and it will probably be ready to set off.

It is best to test it first, however, which may be done by dipping a stick into it ; if the substance drops off clear and hardens quickly, it is made. Pour the mass into some vessel large enough to have the soap cover the bottom about the thickness you would like the bars. The vessel should be wet when the soap is put in. When cool, cut into cakes the size you choose. This soap is very white and nice.

White Hard Soap.—Seven pounds of soda, three of lime, four gallons of water ; boil together till dissolved. Let this stand to settle ; then pour off as long as any remains clear, and add water to make four gallons. Boil this, adding four pounds of grease and two tablespoonfuls of borax ; boil till thick. Take up and put away to cool. When it is cold, cut the pieces rather larger than the size you want them, as it shrinks in drying.

Transparent Soap.—Shave in thin slices one pound of brown bar soap, and put it in a junk bottle with half a pint of alcohol. Without corking the bottle, place it in a basin containing water, put the basin on the stove and boil ten minutes ; then remove the bottle from the water, and turn out the liquid to cool. Before cold, add a few drops of oil of bergamot or lemon to perfume,

Erasive Soap.—Place on a hot stove one quart of soft water, in this put one pound of bar soap finely cut up, one ounce borax, one-half ounce saltpeter, one-fourth ounce of aqua ammonia, and boil until thoroughly mixed. This is one of the best materials for erasing grease, etc., or doing common washings, in use.

Shaving Soap.—Use one-half pint of soft water instead of a quart, and the other materials in quantity as in erasive soap. Cut into cakes of size to suit, when nearly cold.

Toilet Soap.—Sal soda six pounds, unslaked lime three pounds, soft water four gallons, grease seven pounds. Put the water, lime and sal soda into a kettle and boil until dissolved; then let it stand until it settles; pour out the liquid, throwing away the dregs; add the grease to the liquid and boil until the consistency of honey; perfume as you please, color with vermilion.

Gelatine Soap.—Take two pounds of white olive soap and shave it into thin slices; add two ounces of borax and two quarts of cold water; stir all together in a stone or earthen jar, and let it set upon the back part of the stove until the mass is dissolved. A very little heat is required, as the liquid need not simmer. When thoroughly mixed and cooled, it becomes the consistency of a thick jelly, and a piece the size of a cubic inch will make a lather for a gallon of water.

Glycerine Soap.—A very nice article is made by using one pound of bar soap containing olive oil, one pound of glycerine, one pint of alcohol and one pint of water. Shave the soap fine; put the alcohol and water in a kettle over the fire; add the soap, and when dissolved and a greater part of the alcohol has been evaporated, add the glycerine. Continue stirring for two or three minutes, and add any perfume you like.

Honey Soap.—Take one and a half pounds of white soap, half a pound of Windsor soap, cut up fine and dissolve, then add one-fourth pound of honey, and keep it hot until the water is evaporated. Perfume with any favorite oil while the soap is hot; cut into small cakes when nearly cold.

To Refine Soap.—Make a kettle of brine—one pint of common salt to two gallons of water. In five gallons of this brine boil fifteen pounds of soap for two hours. When cold cut in bars, scrape the sediment from the bottom of bars, lay them on the shelf to drain well; expose to the sun for a good while.

Rose Soap.—A very nice article of rose soap may be made by mixing two pounds white soap, three pounds of olive oil soap, and one-half pound of rose water. Cut the soap into thin slices, put into a kettle that sits in another kettle of boiling water. Keep the heat below boiling point until the ingredients are thoroughly mixed, and then add one ounce of finely sifted vermilion, and stir until thoroughly incorporated. If a light rose color is desired, put in less of the pigment. After being thoroughly mixed and heated, take from the fire and add one-half ounce of otto of roses, and about half that quantity of bergamot,

USEFUL AND ORNAMENTAL ARTICLES.

The Fernery.—No house plants have afforded my family so much real pleasure as those of the Wardian case. My case is of circular form, with terra cotta base, such as may be purchased at any first class crockery store, and in it are growing tropical ferns, lycopodium, begonias, etc. The begonia is of the striped leaf variety—I prefer this to the flowering kind, as I have had better luck in growing it.

In managing a case do not attempt to lift off the glass after the plants have got to growing well, and to fill the space, for more damage is done the ferns by handling than there is benefit to be derived.

Water only as often as the earth gets dryish, not oftener than once in a week, and then apply only enough to make the soil moist. To determine when the plants need water, always examine the dirt of the case by lifting the glass a little. The indications of moisture by condensation on the inside of the glass are deceptive.

Home-made Fern Case.—A case that will answer very well may be made of a little seven by nine or eight by ten box, four inches deep. Into this box set four lights of glass, long way up. The box should be just large enough to fit the glass. The dirt well crowded in will hold the glass in place, or they may be cemented. A light a trifle larger on the top completes the box. If it is not air tight, no particular difference will be seen, save evaporation will go on faster, and more attention be required.

For the bottom it would be an improvement to have a zinc square pan made to just fit it after the glass is in place. Cover the bottom of the tray with a layer of charcoal, then two inches of leaf mold, then plant several varieties of the best mosses, with maiden hair and other ferns, ground pine, wild lycopodium, rattlesnake plantain and partridge vine, if wild plants are desired. This last is very desirable for the fern case; the foliage will retain its beauty so long, and its delicate flowers are very pretty. The plants can be arranged with pebbles and mosses interspersed, to add to their rustic beauty.

Novel Vase.—Cover the entire outside of a vase or goblet with brown paper muslin, sewed on or fastened with paste or mucilage. Then cover the muslin with spruce wood twigs, moss and lichens, glued on as taste may dictate.



CASE FOR FERNS, ETC.

These vases, when filled with flowers, have a beautiful effect, especially in country houses.

To Make a Scrap Bag.—Take three pieces of Japanese canvas, each twelve inches long and two inches wide, and embroider them. Then have three pieces of silk, the same shade as the embroidery silk, each four inches wide and twelve long. Puff the silk so it will be the same length as the canvas, turning under half an inch on the sides as a finish for the edges.

Sew the pieces together and finish the bottom with cord and tassels; have tassels at the top where the cord is fastened to the bag. Sew a wire in the top and bottom, and one in the middle, to keep the bag open. Line it with white paper cambric.

Home-made Wardrobe.—Housekeepers who are crowded for closet room can make very neat and pretty wardrobes in their bedrooms. First have three boards, a foot wide, put up, one on top four feet long, and the uprights six feet. Varnish these with shellac. Make a curtain of muslin or chintz—or a double curtain is prettiest—and suspend it from the top by means of a thick cord. Run the cord through the top hem of the curtains and then secure the ends to the boards. This permits the curtains to be drawn aside with ease.

Umbrella Stand.—A tall, slim terra cotta jar may be turned into an umbrella stand, and made to look very artistic. One can be purchased for from seventy-five cents to one dollar. On it paint in water colors a bird and a few cat tails, a number of butterflies or a similar design, and fasten a large bow of ribbon on one side; either a deep crimson color or a pale blue will look best.

To Make a Spool Case.—Use three pieces shaped something like a rose leaf, that is, pointed at each end and widened in the middle, and of any size to suit the taste. They may be cut out in thin pasteboard, and covered and lined with any suitable material. Ribbon quilled around the seams adds to the effect. One seam is left open, and the whole is finished with a bow and a loop of ribbon, intended for hanging up. Designs in braiding or bead work may be used according to taste.

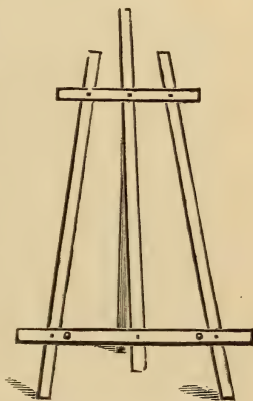
Glass Hanging Shelves.—Take as many long, narrow lights of glass as you wish shelves, and drill holes through each corner. (See how to drill glass.) Bind each shelf with ribbon and pass ribbon from one hole to the other, at both ends of the shelf, so that the glass may be held in a sort of sling. Pass ribbons backward and forward through the holes of the next shelf, so as to go both under and over. The third shelf is similarly treated, the three being separated by such distance as you may desire. Lastly, catch the four ends of ribbon, two at each end, together under a rosette, and hang the whole by the rosette to a hook in the wall, and put bows beneath each hole in the lower shelf. Now arrange your shells and minerals at your leisure.

Pretty Paper Rack.—Get two box covers of pasteboard, same size, about a foot square; place the edges together as you would put a box and cover

together, only not overlapping, then drill holes with an eyelet punch, up two sides of the two covers exactly opposite, two inches apart, then lace up these sides with ribbons, so that the two cover edges will be held together at bottom and spread a few inches at top. The top end of the back box cover had better be carefully cut out. Cut at corners then turned up and made oval, and a hole punched in it to hang the rack by. Decorate side in front and edges, if you choose, with decalcomania or other pictures. A narrow border of pretty paper around the corners will look well, if a large picture is used on front. If two box covers cannot be obtained of same size, use one cover and cut down box to match.

Home-made Easel.—Have three sticks cut five or six feet long, inch and three-quarters wide, and three-quarters of an inch thick. Have them planed smooth and straight. Put them together by nailing on two cleats as represented in the engraving. Spread the bottom twenty inches apart, and have top about a foot wide. In the bottom cleat put two wooden pins for the picture to rest upon, eight or nine inches each way from the center; that is, so that they will be at least sixteen inches apart.

A brace stick, same size as the others, should be about a foot shorter than the side rails, and fastened to the center bar where upper cleat crosses, by means of a small door hinge. Now the easel frame is ready to cover. If you wish for a very nice cover, use velvet or plush; velveteen will do if the others cannot be afforded. Cut strips so that they will just go around the square bars and the edges come together. Use glue or mucilage to fasten. Common pins or gimp tacks should be used to hold the velvet in place until the glue sets. An easel can be made in this way, richer in appearance, for three or four dollars, than can be purchased at a furniture store for twenty. Wine, blue and old gold are the best colors for the covering.



HOME-MADE EASEL.

Handy What-not.—A very convenient what-not may be made at home by use of a few strips of narrow, thin boards and common spools. Have four or five pieces of clapboarding planed out four inches wide and eighteen or twenty inches long, and a quarter inch hole bored two inches from each corner. Stain the boards any color you choose (see page 206), and put them together with cords and spools.

The four cords should be long and stout, and crimson, green or blue in color. Put the cords through from underside of bottom shelf, with knots on lower ends. String two spools upon each cord, then put on another shelf, and so on until finished. The spools that go together should be of same size in diameter, and

all of the spools of same length, that is, all that go together between any two shelves. The spools should be white to start with, and stained same as the shelving. The what-not is to be hung by the union of the cords at suitable distance above the upper board.

Kitchen Boot Rack.—To have a neat kitchen, there should be a boot rack placed behind the stove, in which the damp boots of farmer boys may be placed to dry. Such a contrivance will be found a great convenience. Have three shelves about four feet long, ten inches wide, and placed a foot apart. At one end a boot-jack may be fixed by hinges, so that when not in use it can be folded against one end of the rack and secured by a button.

Have also a stand for cleaning boots at the front, which also can fold up when not in use, and the blacking brushes placed on the shelves behind the stand, out of sight. The two feet of the stand can also be hinged, and when it is folded, hang down out of the way. The rack should be made of dressed pine boards, and painted or stained some dark, durable color. See page 206.

Plush Covered Banjo.—Cheap banjos for decorative purposes can be had where artists' materials are kept, and very commonly the banjo head is painted with bright flowers, large bows of satin ribbon are added, and it is hung upon the wall.

A pleasing substitute for painting is a covering of plush. Embroider a piece with thistles, golden rod, or any design liked. Loosen the screws round the head of the banjo, remove the metal rim, and after laying the plush smoothly over, readjust the rim. Decorate the end of the handle with a bow of ribbon, pass the ribbon on down and end with a bow on the side of the banjo head. Garnet or blue are effective colors.

Covering Frames with Velvet.—Old gilt frames that are tarnished or damaged can be covered to great advantage, also mirrors with plain wooden flat frames, by puffing velvet or felt over them. Another way is colored muslins with dotted swiss puffed over, and finished with colored ribbon bows.

China tiles look well set in flat, square, velvet covered wooden mounts, from two to four inch margins, according to taste. The wood is not difficult to cover, and is done by stretching the velvet well over, turning in the edges neatly with tacks, and then gluing with strong glue, removing the tacks when dry.

Wall Catch Box.—A handy box upon the wall into which may be tossed gloves, cuffs, etc., can be made of two pieces of cardboard, size to suit. Cover the boards neatly on both sides with some fancy paper or pictures; join the sides intended for the bottom together with knots of ribbon; let the upper part of the front one fall forward a few inches, and suspend it in that way by attaching a ribbon from that to the back. Hang it by a cord or ribbon sewed to each end of the back. These can be made very ornamental.

Another Design.—Jenny June tells us how to make up an old, straw, wide brimmed hat. Buy at the druggist's or fancy dealer's a bottle of liquid

gilt, and put it all over the outside of the hat with a camel's hair brush. Let it dry thoroughly, and line the brim with satin, and in place of a crown lining make the satin to form a bag and draw with a drawing cord and tassels. Turn the hat up on one side and put on a large bunch of dried grasses and ribbons, also a few wild flowers.

Children's little wooden pails with fancy pictures on, or painted in water colors, and finished at the top, with satin frilled on to form a bag, are very pretty and inexpensive.

Quilting Frames.—Make the frames in the usual manner with holes bored at proper distances for rolling. Then make four posts of scantling the height you wish, on the top of which put an iron pin just to fit the holes in the frames. The pin should be just long enough to put on both pieces of the frame, with a small hole in the top for a pin to hold in place. If the frames are of the proper size and the quilt made to fit them, you can quilt as easily and nicely "around the corner" as anywhere else.

Cap Baskets.—The *Ladies' Manual* says that a basket of this description is very useful for elderly ladies who dwell in the country and carry their caps when dining out, and it is also useful for carrying about fancy work, etc. A round is formed of silver paper; it is lined, and at each side there is a crimson silk or satin bag, drawn with a silk cord. If preferred, cardboard covered with Java canvas and worked in cross stitch, can be substituted for the silver paper.

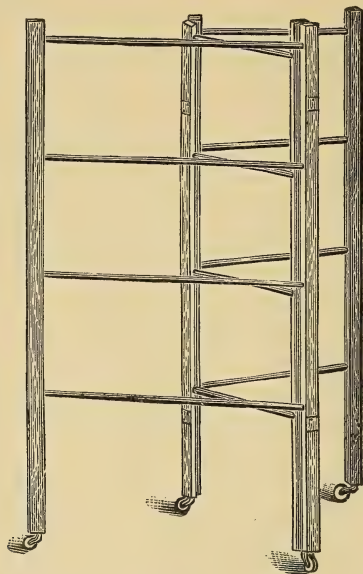
Embroidered Chair Cover.—"Embroidered slips are much used now instead of chintz covers for chairs. They can be made of thin woolen material, or of linen. When of wool they are embroidered with crewels.

"The better way to have the covers fit nicely, is to lay the material on the chair, pin it in places to hold it firmly, and lay the plaits and seams just where they should be, and cut the material then. There are no two chairs exactly alike in shape, and it will be found far more easy to fit them in this way. The seams and edges are bound with braid, and the corners are laced down with cords. The caps for the arms are fastened with buttons and corresponding button holes."

Clothes Rack and Screen.—A boy can make a clothes rack by following the directions hereafter given, and the housewife can put it to a double purpose. Dress out six pieces of light wood, one inch square and five feet long, then cut out twelve other pieces of light wood, half an inch square and two and a half feet long. Chamfer the corners of small rods, and the material is ready.

Lay down the inch square sticks, side by side, and mark across them with a pencil four lines, one, one inch from the top, another fourteen inches below that, the third fourteen inches lower, and the fourth the same distance below that. That will leave seventeen inches at lower end. With a three-eighth bit bore holes at these marks nearly through the sticks.

Fit the ends of the small sticks, being sure they are of equal length, and put together as illustrated; fasten with glue or brads and hinge together. Small chair casters can be put on if desired.



HOME-MADE CLOTHES RACK, OR SCREEN FRAME.

To convert the clothes horse into a screen, cover with coarse muslin nailed tightly down each side, and a strip of red plush or velvet turned over the wooden edges, and tacked round to form the binding. To form the panels, use satin, and embroider in colors a design of one or two long stalked, ox eyed daisies, with a few leaves and blades of grass, and several rich hued butterflies.

This design would be more effective if embroidered on pale blue. Another pretty way of decorating is to press flowers and grasses, tie them in bunches as desired, and fasten on the panels; then back of the spray paint shadows of flowers and leaves, and long, bending grasses.

Checker-board Screen.—A pretty simple screen is made of a small clothes horse covered with black velveteen and orange satin, cut in strips two inches wide, and woven in checker-board fashion, the ends of the strips sewed or tacked to the rods of the frame. Felt cut into strips, with the edges pinked and similarly arranged, like basket work, makes a pretty, cheap and serviceable screen for a room in constant use. Tack on strips one way first, close together, then weave in, over and under, in an opposite direction, fastening as you go. It is better to cut strips length of frame before tying.

The bottom of the panel will be improved by a row of balls or tassels, or if

the felt is used, a four inch strip of it can be cut into strands to make a very suitable fringe. To make a screen in this manner with both sides alike, each piece should be long enough to meet and sew together. The seam can be slipped under one of the interlacing pieces.

Pretty Greenery.—Procure a one or two gallon crock that is porous—the pinkish red that are not glazed are best. Soak this until it is well saturated with water, then cover the surface while it is wet with timothy seed; fill with water and set in a dark place for a few days. The seed will adhere to the crock and grow. It will soon become a novel looking object and quite attractive. Glazed crocks covered with cloth and kept wet will become a greenery also.

Stocking Apron.—An apron made after the style of hospital aprons, with two or three deep pockets extending from the hem half way up the length of the apron, is handy. In these pockets yarns of various colors and qualities have place, and there is room for perforated hose to bide its time of repair. There are darning needles in it, and old stockings for making new feet and heels.

When repairing is to be done, the apron may be put on, and all the material required is at hand. A pretty one is made of a damask towel with wide borders at each end. Cut the border off one end, and put it on above the border at the other end. Sew at sides and bottom, then divide into pockets. Another improvement can be made by putting both fringes at lower end, so making it heavier.

KITCHEN AND TABLE WARE.

Fastening on Knife Handles.—Set the handle upon end, fill the cavity with pulverized resin, then warm the small parts of the knife or fork and insert it slowly, crowd it down firmly and hold it in right position until the resin cools enough to set. As resin is not soluble in water, the knives are not loosened. Glue or any other cementing material soluble in water is not available. Glue may be made to resist water, however, by putting two ounces of it in a pint of skimmed milk, and evaporating the mixture to the proper consistency for use.

The following is a cement I prefer to resin, but is not so cheap and handy: One-fourth pound of colophony—which may be found at almost any drug store—two ounces of sulphur melted together; mold into bars, and when wanted to use, powder sufficient quantity for use and mix with half part of iron filings or fine brick dust, then use same as the resin. This makes a very fine and lasting cement. See page 198.

Discolored Ivory Knife Handles.—Where ivory handles have become yellow, they may be restored by soaking a few hours in a watery solution

of sulphurous acid. The acid in a gaseous state should not be used, as it will be likely to make the handles crack.

Charcoal for Table Knives.—Powdered charcoal is a good thing to use in scouring knives and forks, as it will not wear them out near so fast as brick dust, which is most commonly used. A small, fine grained grindstone would be a good thing to have in the kitchen; it would whirl the grime off the knives in double quick, but the forks would have to be scoured by the usual process.

To Clean Rusty Table Knives.—Where the knives have got rusty by neglect, rub the blades over thoroughly with sweet oil; allow this to remain as long as possible, a day or so at least, then rub the steel with finely powdered, unslaked lime or pumice stone. To keep them from rusting when not in daily use, dry them thoroughly and roll up in a flannel cloth and keep it in a dry place.

To Cleanse Silver.—Clean silver with hot water, followed by a solution of equal parts of spirits of ammonia and spirits of turpentine; and after this, if necessary, prepared chalk, whiting, magnesia or rouge.

Another Method.—It is claimed that water in which potatoes have been boiled exercises a remarkable cleaning influence upon silverware of all kinds, especially spoons that have become blackened by eggs. Even delicately chased and engraved articles can, it is said, be made bright by this method, even better than by the use of the ordinary polishing powder, which is apt to settle in the depressions, requiring particular care in its removal.

The proprietor in one of the oldest silver establishments in Philadelphia says that "housekeepers ruin their silver by washing it in soap suds, as it makes it look like pewter.

To Clean Silver Plate.—In the first place, every particle of grease must be removed by means of hot water, in which is dissolved a small bit of cooking soda; it must then be thoroughly rinsed in clear, warm water and wiped with a dry, soft towel, or a piece of wash leather.

It may then be rubbed with fine whiting with a bit of flannel or chamois skin; if there are stains on the plate, the whiting should be rubbed on, mixed with water or a little sweet oil, and allowed to remain several hours; but if the silver is merely tarnished, it will be sufficient to give it a dry polish by using the whiting of very fine plate powder, dry, and polishing by a soft wash leather, cleansing the chased portions with a soft bristle brush.

All plate and silver in common use should be cleaned at least once a week, but too severe rubbing will soon wear out even the celebrated Sheffield plate. Plate should be well protected in a dry closet or drawer; a box lined with flannel is the best receptacle.

The practice of leaving silver exposed on the sideboard is injurious to the plate, from the fact that there exists in the air a portion of sulphuretted hydrogen gas, which turns the silver black. The habit of melting off spermaceti

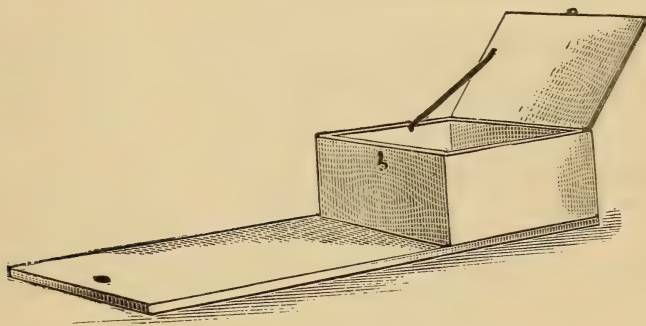
from candle sticks, by placing them near the fire, is destructive, if moderately hot water and soda will not remove the grease, a little alcohol will.

Cleaning Solid Silver.—Silver is most susceptible of spotting and discoloration by sea air, the human perspiration, the presence of sulphuretted hydrogen (as seen in an egg spoon left uncleaned), and by the contact of mice; the latter cause has irretrievably injured some new plated ware, never used, but left on a sideboard accessible to these little vermin.

It is the practice of the East Indian jewelers never to touch silver and gold with any abrasive substance. The most delicate filagree work and wire constructions of silver are rendered snowy white by their simple manipulation. They cut some juicy lemon in slices; with these rub any large silver or plated article briskly, and leave it hidden by the slices in a pan for a few hours.

For delicate jewelry they cut a large lime or lemon nearly in half and insert the ornament; they then close up the halves tightly and put it away for a few hours. The articles are then to be removed, rinsed in two or three waters, and consigned to a saucepan of nearly boiling soap suds; well stirred about, taken out, again brushed, rinsed and finally dried on a metal plate over hot water, finishing the process by a little rub of wash leather (if smooth work).

Handy Scouring Box.—A very simple and handy scouring box may be made by simply fastening with screws or nails a small box to a piece of board, as represented in the illustration. The box should have a catch upon it of some



CHEAP HOME-MADE SCOURING BOX.

kind, a little hook and staple will do, so that the lid may be fastened down when done using, and the whole arrangement hung up.

To Take Stains Out of Silver Plate.—Steep the plate in soap lyes for the space of four hours; then cover it over with whiting, wet with vinegar, so that it may stick thick upon it, and dry it by the fire; after which rub off the whiting, and pass it over with dry bran, and the spots will not only disappear, but the plate will look exceedingly bright.

Keeping Tin Ware Bright.—It is a very good plan every week to gather up the tin ware that is in daily use, and wash it well with hot suds and a woolen cloth in the tub or boiler. The brightness thus given to it is nicer than from scouring; besides, the ware is not worn out, and the seams about the handle and spouts can be made very clean. Never use lye to clean tin, it will soon spoil it. Kerosene and powdered lime, whiting or wood ashes will scour tin with little trouble. Do not scour your tin dishes unless you have some stain that cannot be removed by flannel and soap. Scouring injures them by wearing away the coating and exposing the iron.

Convenient Dish Pan.—A housewife writes: "Let me tell you how I have my dish pan made, and I believe others will follow my plan—they certainly will if they know how much more convenient it is than the old style.

"Instead of having it round it is made oblong, being about fifteen inches wide at the top by twenty-four long, narrower at the bottom, of course the same as common pans are made. In the center there is a tin partition, soldered in firmly at the ends and bottom, so that I have two compartments, one for washing the dishes in and the other for rinsing them in.

"Such a pan as this is not unhandy to use, and saves the trouble of keeping a rinsing dish, and what is more advantageous, it prevents the liability of neglecting to rinse the dishes at all when they come out of the wash water. This neglect is very common, much more so than it should be. A meat plate cannot be made clean by simply washing it in greasy dish water and wiping it with a damp cloth."

To Mend Tin Ware.—It may be done with putty. It is very easily applied and it is much better than to throw articles away. Put it on the outside; let it thoroughly dry, and you will never have to mend that place again. See Solder and Soldering, page 189.

Japanning Old Tea Trays.—First clean them thoroughly with soap and water and a little rotten stone; then dry them by wiping and exposure to the fire. Now get some good copal varnish; mix with it some bronze powder and apply with a brush to the denuded parts. After which set the tea tray in a very hot oven until the varnish is dry. Two coats will, it is said, make it equal to new.

To Clean a Spider.—Soap will not clean a greasy spider. Put ashes into it and pour in a little water. In a few minutes scrape it all out with a stick and rinse it out with water. It is then ready for your dish water and cloths without additional soap. Some keep a jar of lye beside the sink into which to dip any very greasy dish. There is no better way of cleaning a spider in which onions have been cooked than to boil ashes and water in it.

Baking in Stone Cocks.—Either brown or white bread baked in stone cocks holds moisture much longer than when baked in the usual tin molds. The flaring topped one gallon cock, such as is used for setting milk in, is

the most suitable size. These crocks are very much used for boiling vegetables, making sauce of different kinds, baking puddings, etc., and are a great improvement over tin or iron vessels.

To Clean Preserve Jars.—Sweetmeat jars or bottles may be cleaned without scraping them, by pouring in the jars hot water and a teaspoonful or two of pearlash. The contents which remain sticking to the sides and bottom of the jar will be disengaged by the pearlash and float loose in the water.

Wash kettles the same way, or other vessels which you wish to purify or clear from grease. Strong lye poured off clear from good hickory ashes will answer nearly as well for the same purpose, and for kegs, buckets and other large cooking utensils, lye from wood ashes may always be used.

To Clean Jars and Buckets.—A convenient method of cleansing a jar, bucket, tub or barrel, is to place a small quantity of lime on the bottom, and then slaking it with hot water in which as much salt has been dissolved as it will take up. It will purify it like a charm. Cover vessel to keep steam in.

Sweetening Stone Jars.—A housekeeper writes: "Having some stone jars in which lard had been packed until they became unfit for use, I made them perfectly sweet by packing them full of fresh earth, and letting it remain two or three weeks. This is an experiment with me, and I suspect it would be equally effective in any case of foul earthen or stone ware."

Mending Broken Dishes.—As soon as a plate gets cracked part way across, crack it the rest of the way; don't wash it after breaking, but cement it at once. Pie or baking plates that have been used for even a few times after being cracked, cannot be as successfully mended as those freshly broken, for cementing materials will not adhere to greasy surfaces with much tenacity.

White Lead for Mending Dishes.—Prepared white lead can be purchased in pound cans and kept always ready for use (after the can has been opened keep a little linseed oil on the surface to prevent the lead hardening). Paint both edges of the parts with the lead mixed to a consistency little thicker than it usually is when spread with a brush; bind the article closely, and allow it to stand until perfectly dry before putting into use again. Nothing is gained by setting the repaired article where it is hot, for the power of the cement is greatly lessened by this operation. When purchasing the paint, be sure and get a pure article of lead, for Spanish whiting will not answer the purpose. Lead freshly mixed is not good; the material becomes more adhesive by standing a while, both as a cement and as a paint.

Cementing Dishes with Milk.—The old plan of boiling broken dishes in milk is a very quick way of mending, and I have seen those made permanently strong by simply being tied up, soaked in warm, freshly drawn milk and dried; what I mean by warm, freshly drawn milk is that containing the animal heat. A glutinous property, doubtless caseine, penetrates the fracture and congeals with a firmness very tenacious.

To Mend China.—Mix together equal parts of fine glue, whites of eggs and white lead, and with it anoint the edges of the articles to be mended; press them together, and when hard and dry scrape off as much of the cement as sticks about the joint. The juice of garlic is another good cement, and leaves no mark where it has been used.

Another Method.—Take a very thick solution of gum arabic and stir it into plaster of Paris until the mixture is of proper consistency. Apply it with a brush to the fractured edges of the chinaware and stick them together. In a few days it will be impossible to break the articles in the same place. The whiteness of the cement renders it doubly valuable.

Isinglass Cement for Dishes.—Take isinglass, one ounce; distilled water, six ounces; alcohol, one and one-half ounces; warm in a water bath till dissolved, and strain the solution. Add to the clear solution, while hot, a milky emulsion of gum ammoniac, one half ounce, alcoholic solution of gum mastic, five drams; this possesses great adhesive qualities.

Fire-proof Cement for Dishes.—To make a fire and water-proof cement to be used on broken ware, take a teacupful each of vinegar and milk, mix, separate the curd and mix the whey with whites of two or three eggs; beat this mixture well together, then add enough common or quick lime to make the cement of proper consistency. A less or greater quantity can be made as required. It will be found good.

Sugar Cement for Dishes.—Starch, one ounce; white sugar, four ounces, added to a solution of one ounce of gum arabic in hot water the mixture is boiled until the starch is cooked.

Waterglass Cement for Dishes.—Waterglass is said to make a good material for mending either china, earthenware or glass.

To Clean Porcelain.—A very good material for cleaning either porcelain or glassware is fuller's earth, but it must be beaten into a fine powder and carefully cleared from all rough or hard particles. If hard particles are left in they will endanger the polish of the brilliant surface.

Use for Old Dishes.—Old dishes, not greasy, I have found useful and pretty to hold nice green growing things—say a sod of opening violets—which will grow and bloom and get greener and prettier the longer it stands on your window sill; or a mat of door yard ivy, or myrtle, or anything that trails and tangles, and is beautiful.

To Pack Crockery.—As a rule, when packing crockery in a box or barrel, put all of the heavy pieces at the bottom, then mark the box that it may be kept right side up. Use straw or hay to pack them in, and if they are to be sent a long way and are heavy, the hay or straw should be a little damp, which will prevent them slipping about. Use plenty of this material, and keep the ware pressed closely together. At top, bottom and on the sides there should be a good thickness of new straw. New straw is more elastic than old.

CARE OF GLASS ARTICLES.

Cleaning Mirrors.—Never allow the plate of a mirror to be cleaned with newspaper. Almost all newspapers now used contain straw as a component, and as the substance of straw is largely composed of silex (flint), which cannot be entirely eliminated in the process of manufacture, the result is a multitude of minute scratches on the face of the glass, not always visible to the naked eye singly, but finally in a mass producing a cloudy and dull appearance, ruinous to the glass. Chamois skin kept in a drawer free from dust, and the delicate tissue paper, are the best materials for glass cleaning.

Repairing Mirrors.—Take a piece of a broken mirror and mark out with a knife point a section a little larger than the place to be repaired, put a drop of mercury upon it, and in a short time the material may be lifted off by means of a thin blade and conveyed to the bare place; after placing it carefully, press it down with some soft material like raw cotton. Before applying the quicksilver be certain that the damaged spot is made perfectly clean, as any specks or greasy spots will make the work incomplete.

Perhaps the work can be more effectually done by sliding the mercury from the broken piece of glass. Repairing mirrors needs a little practice first upon pieces.

Silvering Mirrors.—Take a sheet of tinfoil and spread it upon a table; then rub mercury upon it till the two metals incorporate. Lay the plate of glass upon it and load it with weights, which will have the effect of pressing out the excess of mercury that was applied to the tinfoil. In a few hours the tinfoil will adhere to the glass and convert it into a mirror.

To Protect Mirrors.—A mirror hung where the sun can shine on it is usually spoiled; it takes a granulated appearance familiar to housekeepers, though they may not be acquainted with its cause. In such a state the article is nearly worthless; the continuity of its surface is destroyed, and it will not reflect outlines with any approach to precision. Care should therefore be exercised in hanging.

When moving from one house to another, not unfrequently a man or boy may be seen in the street carrying a mirror in such a way that the full glare of noonday sun strikes and injures. Owners of such articles would, as a rule, be able to keep and use them much longer if they would exercise more caution in this regard.

Avoid hanging a mirror near a stove or fire place, where the heat radiated can reach it. If this precaution is neglected, granulation is likely to occur, even in a comparatively dark room, by the influence of warmth instead of light. A lamp or gas jet, if placed too close while burning, though it may not crack the glass, will often bring about the same injurious crystallization.

In packing mirrors for removal, they should be placed by themselves in a box, and fixed in their places by side pieces and wedges, driven closely and nailed; laths should be placed across mirrors, and no elastic materials, as pillows or feather beds, be used in packing them.

To Clean a Globe.—If the globes on a glass fixture are much stained on the outside by smoke, soak them in tolerably hot water in which a little washing soda has been dissolved. Then put a teaspoonful of powdered ammonia in a pan of lukewarm water, and with a hard brush scrub the globes until the smoke stains disappear. Rinse in clean, cold water. They will be as white as if new.

To Perforate a Globe.—It is said that a small hole may be bored through the top of a glass globe by first cementing to the glass with beeswax a small block of wood, with a hole in the center as a guide. Then procure a piece of copper tube of the diameter required and of convenient length for the drill.

Pass the thread of a bow string around the tube, supply it with the finest emery and water, and work the bow back and forth, so as to twirl the drill (the tube). (See "Spring Bow," page 252.) The hole will soon be cut through the glass. This will answer for perforating glass of any kind.

How to Drill Glass.—A hard steel tool will cut glass with great facility when kept freely wet with camphor dissolved in turpentine. A drill bow may be used or even the hand alone. A hole bored may be readily enlarged by a round file. The ragged edges of glass vessels may also be thus easily smoothed by a flat file.

Flat window glass can readily be sawed by a watch spring saw by aid of this solution. In short, the most brittle glass can be wrought almost as easily as brass by the use of cutting tools kept constantly moist with camphorized oil of turpentine.

It is said diluted sulphuric acid is much more effective, with less wear of the tool, than oil of turpentine. It is stated that at Berlin, glass castings for pump barrels, etc., are drilled, planed and bored like iron ones, and in the same lathes and machines, by the aid of sulphuric acid.

To Cut Glass.—The same liquid, turpentine and camphor, as used in drilling, may be used in cutting with any steel instrument, or even a sharp edge of an arrow point or fragment of flint. I have used in a chemical laboratory a small flame from an alcohol lamp for cutting, or rather cracking, glass. First at the edge file a notch for a starting point, then apply the flame, which may be produced through a minute perforation in a glass connected with some rubber piping, so as to allow of the flame being conveniently carried from point to point. The crack will run before the flame in any desired direction.

To Divide a Tube.—Place the tube in a vessel of water, to the height where it is designed to break it; also fill tube to same level. Now pour coal oil

inside and out on the water; cut a ring of paper fitting the bottle or tube; saturate with alcohol or benzine so that it touches the oil. Pour also some inside the bottle. Set on fire; the cold water prevents the glass from heating below its surface, while the expansion caused by the heat will break the vessel on the water line.

Cheap Glass Cutter.—A correspondent gives the following simple way of making a good glass cutter. With the addition of camphorated turpentine, it will probably answer the purpose of a diamond.

Take an old, worn out, three cornered file, grind the end to a three cornered point, heat it red hot, and immediately plunge into a mixture of snow and salt. Retouch it on the stone to remove the scale, and it is ready for use. If rightly done it will give very good satisfaction.

In using it, hold the file nearly perpendicular, slightly inclined forward, and with a gentle pressure draw it rapidly over the glass without changing its inclination to the surface. In cutting thick glass it is safer to cut on both sides before attempting to separate the pieces, but thin glass may be cut with the greatest facility.

When the point becomes dull from use it will produce only a ragged surface—scratch, but will not cut. It then needs regrinding. A single turn of the stone is sufficient to put it into working order again. Such a glass cutter is very serviceable for preparing glass for various purposes. The sharp corner of a piece of flint will sometimes cut glass readily.

To Mend Tumblers.—For mending glass tumblers to be used for keeping jellies, etc., in, white lead is good; in fact almost any of the cements used for broken dishes are, but for ornamental glassware a transparent cement is required. Balsam of fir used in a thick state is excellent, but will not stand hot water. Seventy-five parts India rubber mixed with sixty parts of benzine and fifteen parts of mastic is said to be a good transparent mixture for repairing glass, but I have never tested its virtue.

To Remove Glass Stoppers.—Take the bottle or decanter by the neck with the left hand, and place the first finger at the back of the stopper. Take a piece of wood in the right hand, and tap the stopper first one side and then the other, turning the decanter around in the hand. A quick succession of little, short taps, is the most effective.

If this plan fails, wind a bit of rough string once around the neck, one end of the string being held by one person, and the other by another; pull backward and forward till the neck becomes hot with the friction. Then tap as before.

Where the stopper is not loosened by mechanical influences alone, put one or two drops of sweet oil round the stopper, close to the mouth of the bottle, then put it a little distance from the fire. When the decanter gets warm, have a wooden instrument with a cloth wrapped tight around it; then strike the stopper, first on one side, then on the other; by persevering a little while you will most

likely get it out. Or you may lay the bottle in warm water, so that the neck of the stopper may be under water. Let it soak for a time, then knock it with a wooden instrument as before.

Sometimes they may be loosened by binding around the neck of the bottle a cloth wet with boiling water. Another way recommended is to put a drop or two of glycerine in the crevice about the stopper. In an hour or two the stopper will be loose.

To Mend Broken Glass.—Most of the substances used in mending broken glass so color the seam that it gives a bad appearance. Gum shellac is the best material I ever applied for mending tumblers, bottles, etc.

Dissolve the shellac in alcohol until about the consistency of molasses, and apply with point of penknife or splinter of wood. It sets quickly, and makes the mend firm, and will stand any common usage; boiling water, however, will soften the cement and sever the parts. Another way is to dissolve fine glue in strong acetic acid to form a thin paste.

To Clean Bottles, Etc.—To clean glasses, bottles and decanters brightly, break a few raw egg shells in the article to be cleansed, with a little cold water—if greasy, warm—and a little soda; shake well, rinse with plenty of cold water, and the objects will shine as nothing else will make them. Another way is to rinse them out thoroughly with water and powdered charcoal. Charcoal allowed to remain in for a few hours will act as a good disinfectant. When greasy substances have not been used bottles may be cleaned by half filling with tea leaves and a little water, and then add a spoonful of common vinegar; proceed to shake all together thoroughly, then empty, and rinse well with cold water. To clean flasks and small necked vessels chemists use blotting paper, with enough water to make it into a pulp. Vigorously swung round, this will clean the dirtiest vessel. My process to thoroughly clean a bottle that is to be used for medicine, is to wash with hot water, soap, sand and ashes. Shake well, then rinse thoroughly with ammonia water, finally with clean water, then set the bottle top downward to drain. After apparently dry, put in an oven and bake for an hour, then rinse with pure alcohol, cork it up and put it away for use. All bottles about a house should be kept labeled.

Musty Bottles.—It is often the confined air, and not the bottle, that is musty; because in washing, the bottle being but partly filled with water, the air is but partly expelled. After washing the bottle, it should be filled to overflowing with cold water, and it will be found perfectly free from mustiness.

Simple Mode of Toughening Glass.—A Leipsic journal gives a method which it asserts will prevent lamp chimneys from cracking. The treatment will not only render lamp chimneys, tumblers, and like articles more durable, but may be applied with advantage to crockery, stoneware, porcelain, etc.

The chimneys, tumblers, etc., are put into a pot filled with cold water, to

which some common table salt has been added. The water is well boiled over a fire, and then allowed to cool slowly. When the articles are taken out and washed, they will be found to resist afterward any sudden changes of temperature.

To Clean Glass.—A street lamp cleaner, in New York City, says that the best article for cleaning glass is kerosene. He used that sometimes mixed with sperm oil and stove blacking, but the best recipe for removing stubborn, sticky dirt on glass is a little oxalic acid, a little alcohol, and equal parts of kerosene and sperm oil. And a curious thing about it is, that the older and dirtier his rag gets, the better it seems to clean the glass.

To Clean Lenses.—The lenses of spectacles or spy glasses that have become scratched and dimmed by age may be cleaned with hydrofluoric acid, diluted with four or five times its volume of water. The solution should be dropped on a wad of cotton and thoroughly rubbed on the glass, which should afterward be well washed in clear water. Great care must be exercised in handling this acid, as it eats into the flesh, often producing painful and obstinate sores.

Care of Spectacles.—Always note the number of your glasses and the date of first using them—if lost, you can tell what number you want. Glasses should be washed in cold water every day, wiped dry with a linen fabric and then with buckskin, never with paper, as it scratches them.

Cheap Frosting for Glass.—It sometimes happens that a housewife wishes some glass article frosted, and it may be done without expense. The panels in doors are frequently frosted by dabbing the end of a new, dry paint brush against the glass upon which has been spread a very thin layer of white paint.

One writer upon this subject says he has found no material more simple than skim milk, with a little powdered whiting mixed with it, say as much whiting as the size of a walnut, reduced to a fine powder, and thoroughly mixed with two or three quarts of milk.

I would advise those trying the method to do a piece of glass first. Let it dry, and add to the milk or whiting as they require less or more shading. If it be put on quickly and thinly with a brush, and followed at once with a dry duster brush, merely daubing it quickly with the dry brush, the shading will have the appearance of shaded, ground glass, and look quite neat.

A common preparation for frosting glass to prevent the too direct action of the solar heat, is a wash of whiting and glue water. It must not contain too much glue if it is desired to wash it off late in the season. Sometimes this frosting is desirable for the shading of house plants.

Frosted glass, useful for screens, etc., is made by laying the panes horizontally and covering them with a strong solution of sulphate of zinc. The salt crystallizes on drying.

To Letter Glass.—To letter with gold and silver leaf on glass, prepare the size by dissolving one ounce of isinglass in just enough water to cover it; when dissolved, add a pint of good alcohol and shake up to a quart with water. Give the clean glass a flowing coat of this and carefully lay on the leaf, which will then readily adhere to the glass. Let it remain twenty-four hours to dry.

The design or letter is drawn on paper, and the lines pricked with needle holes. Place this against the gilded surface and dust it thoroughly with powdered whiting. When the paper is removed, there will remain a correct copy of the design or letter on the gold. Now fill up the outline with oil gold size in which has been ground some orange chrome, thinned somewhat with boiled oil and turpentine. When this has thoroughly dried, wash off the surplus gold with water, applied with a tuft of cotton.

To Make Glass Jars Look Like China.—After securing the figures, cut them out, so that none of the white of the paper remains; then take some thick gum arabic water, pass it over all the figures, and place them on the inside of the glass, to taste.

Let them stand to dry for twenty-four hours; then clean them well with a damp cloth betwixt the prints, and let them stand a few hours longer, lest the dampness should move any of the edges; then take white wax and flake white ground very fine, and melt them together. With a japanning brush go over all the glass and above the prints.

Done in this manner, they will hold water. Or, boil isinglass to a strong jelly, and mix it up with white lead, ground fine, and lay it on in the same manner; or use nut oil and flake white. For a blue ground, use white wax and Prussian blue; for red, wax and vermilion or carmine; for green, wax and verdigris; for chocolate color, wax and burnt umber.

MANAGEMENT OF LAMPS.

To Clean a Lamp Chimney.—Most people in cleaning lamp chimneys either use a brush made of bristles twisted into a wire, or a rag on the point of scissors. Both of these are bad; for without great care, the wire or scissors will scratch the glass as a diamond does, which, under the expansive power of heat, soon breaks, as all scratched glass will. If you want a neat little thing that costs nothing, and will save half your glass, tie a piece of soft sponge the size of your chimney to a pine stick.

Another Method.—Hold a linen cloth against one end of the chimney and place the other end at your mouth; breathe on it until it is covered inside with moisture; push the cloth into the chimney with a smooth, slender stick, and

rub it around until the moisture is absorbed ; repeat the process and breathe on the outer surface ; also rub this with a cloth until dry, and you have a clean, bright chimney. Soft newspaper will take the place of a linen cloth. Do not use cotton cloth on glassware.

To Repair Lamp Chimneys.—Keep a small vial of carriage varnish and apply a little with a feather to a crack ; then burn it upon the lamp several evenings before washing it. The heat makes it very hard and durable, though it discolors the chimney a little. It may be of value at times when it is not convenient to get a new one. See "Cements."

How to Test Lamp Chimneys.—Every person who has any experience with lamp chimneys is aware of the want of uniformity in the length of time they will stand use. Some will stand for months, while others, apparently as sound and good, will break after a short use, with no apparent cause. The great cause of their being brittle and breaking so easily lies in the material they are made from. There is shoddy in glass as well as in cloth.

Cheapness being the order of the day, a great many manufactories make chimneys from cheap materials.

The uninitiated may tell the different qualities of glass by ringing it ; the vibrations of the lead glass chimneys have a sweet, bell like sound, while the lime glass has a short, harsh sound.

To Toughen Lamp Chimneys.—A correspondent of mine says when you buy a new lamp chimney put it in a vessel of cold water, set it on a stove and let it boil. You can never break that chimney unless you throw a flat-iron at it.

To Ornament a Lamp Shade.—A pretty effect may be produced by pasting with mucilage autumn leaves and ferns on the inside of porcelain shades, particularly those belonging to the student lamp. They should be the brightest, smallest specimens, and may be arranged either in clusters or a wreath all the way around. They should be prepared in the usual way, pressed or ironed. They will remain bright two or three months, and when faded can easily be soaked off with warm water and replaced with others.

Filled-up Lamp Wicks.—The unsatisfactory light frequently given by kerosene lamps is often due to the wick. The filtering of several quarts of oil through a wick which holds every particle of dirt in it, must necessarily gradually obstruct the pores of the wick. Consequently, although a wick may be long enough to last some time, its conducting power may be so impaired that good light cannot be obtained. The only remedy is a new wick. Burners are often thrown aside as worthless, on account of the difficulty of raising and lowering the wick, when the fault is almost invariably with the wick.

Home-made Lamp Wick.—A very good lamp wick may be made out of Canton flannel. Take a strip three times as wide as you wish the wick to be, and as long as you like. Fold it with the fleecy side in, so that it will have

three thicknesses, and baste or overcast it up the side. Almost every house-keeper has bits of Canton flannel which would be used for nothing else.

To Mend Lamps.—Boil three parts of resin with one part of caustic soda and five parts water, which mix with one-half its weight of plaster of Paris. Zinc white or precipitated chalk may be substituted for plaster of Paris, but the material will be longer hardening.

To Prevent Lamps Exploding.—The cause of explosion has usually been attributed to allowing the oil to get low in the lamp, the vacuum filling with gas. Another cause assigned is, that explosions sometimes take place through neglecting to cut off the charred portion of the wick when the lamp is filled.

Observation will show that in a few days' use the wick becomes like charcoal in composition considerably below the top of the tube, and after the lamp has burned a short time the heated tube fires all of the charred portion of the wick inside, and that sets the oil on fire below; this may be prevented by cutting off a sufficient portion of the charred wick each day after using the lamp.

Thus it appears that all housewives have to do to make the use of coal oil lamps as safe as any other, is to keep them full; fill them by daylight, and have the wicks well trimmed. It is claimed also that a tablespoonful of salt in the oil of a lamp will render it non-explosive.

To Prevent a Lamp Smoking.—The following process is said to be a sure way to prevent oil lamps from smoking: Take any quantity of onions, bruise them, put all into a retort and distill; pour a little of this liquor into the bottom of the lamp, and it will not smoke.

How to Fill a Lamp.—One of the rules of the household should be that the lamps be filled during the daytime. If a lamp *must* be filled at night, for any reason, don't lay the lighted burner **over** on one side of the lamp while pouring in the oil, but extinguish it, or take it out entirely, and remove the lamp at least three feet from any light or fire while filling it.

Safeguard for Lamps.—One great danger in the use of coal oil lamps lies in the breakages that frequently occur from dropping or upsetting them. The lamp that is carried about the house by servants and children should be filled with cotton.

After it is stuffed lightly it will receive only about one-half the quantity of oil which it would if the cotton was not put in. If any accident happens, the oil cannot spill or flow about, but being absorbed in the cotton, it burns like a fagot, but all in one place.

The wick embedded in the cotton will absorb the oil as readily as if lying in the clear fluid.

How to Test Lamp Oil.—Take a common quart bowl, fill it one-third full of boiling water; now add cold water, a little at a time, until a thermometer placed in it indicates a temperature of one hundred and ten degrees Fahrenheit,

A tablespoonful of the oil to be tested may be turned into the water, and stirred about with the thermometer. It will float on top and it may be touched with a lighted match or bit of paper. If it ignites, or takes fire, the oil is dangerous; and the seller can be prosecuted under the United States law. It must not be used in the family.

In this experiment, so simple that all can make it, an accurate thermometer should be used.

MANUFACTURE AND CARE OF FURS.

Loss in Furs.—Probably the reason that furs are not more extensively used in the rural districts of this country, is because they are expensive if purchased, and people commonly do not know how to prepare the fresh skin for domestic use. The *American Artisan* once furnished some very good hints upon this subject, which I give in substance: It is no extravagance to assert in this connection that every farmer's family may furnish their own fur collars, gloves, robes, and other articles of dress and ornament, with trifling expense, from the resources within their own reach, but from want of more knowledge on this subject valuable skins are wasted or disposed of for a mere fraction of their real value, and articles of apparel that should have been made from them are bought at extravagant prices of fur dealers.

What Furs May be Used.—The skins of raccoons, minks, muskrats, rabbits, foxes, deer, cats, dogs, woodchucks and skunks, are all valuable. Hand-some robes may be made from the skins of the last two animals, and the writer has seen fur coats made from the skins of woodchucks, well tanned, dyed and trimmed, which were elegant as well as comfortable, and no one but a connoisseur would be able to guess their origin. Of the finer and nicer furs, beautiful collars, muffs, cuffs, caps, gloves, and trimmings may be made with little ingenuity and perseverance; and who would not feel great satisfaction in wearing a nice article from the fact that it was something of his own manufacture, a product of his own taste and genius?

Furs and Skins for Mats.—Very handsome floor mats are made by tanning skins of large fur bearing animals, then dyeing them some bright color, which is done with very little trouble, the art of dyeing is now so familiar to almost every household. Furs may be dyed as easily as woolen goods, notwithstanding the impression that it is an art known only to the trade. Any dye that will color woolens will also dye furs. One care must be taken not to have the dye too hot, or the texture of the skin will be injured.

Tanning Skins and Furs.—The mode of tanning usually followed by city furriers is to rub the skins well with rancid butter, then tread them thor-

oughly in a tub or vat, after which a large quantity of sawdust is mixed with them, and the process of treading continued until all the grease is absorbed, when they are finished off by beating, working, and rubbing with chalk and potters' clay, whipping and brushing.

An old trapper practiced this method with small skins, first washing with a suds of soap and sal soda to free them from grease, then rinsing in clear water to cleanse them from the suds, then rubbing as dry as possible, after which they were put into a mixture of two ounces of salt to a quart of water, added to three quarts of milk or bran water, containing one ounce of best sulphuric acid.

They are stirred briskly for forty or fifty minutes; from this they are taken dripping into a strong solution of sal soda, and stirred till they will no longer foam; they are then hung up, and when nearly dry are taken down and rubbed dry, when they are very soft and pliable.

A very good and simple process in use among farmers is to sprinkle the flesh side, after scraping it well, with equal parts of pulverized alum and salt, or washing it well with a strong solution of the same, then folding the flesh side together, and rolling it compactly, in which state it should remain for eight or ten days; then it is opened, sprinkled with bran or sawdust to absorb the moisture, and rolled up again, and after remaining twenty-four hours the process is completed by thorough rubbing and manipulation, on which the pliability depends.

Skins when taken off should be freed from grease or flesh, by thorough scraping, when they may be dried and left to await the leisure of the owner. Previous to tanning they must be well soaked and wrung dry. See page 308.

How to Color Skins.—To color buff: Five parts whiting to two parts yellow ocher, and mix them with water to a paste; make into cakes and dry. When a dressed skin is dry, rub one of the balls on the surface; rub the powder in; take a piece of sand paper and raise a nap on the leather by going over with it. This is simply to color the leather side.

To color black: Use clear logwood; after it is dry use copperas water to blacken it. Be careful not to use too much copperas.

To color dark brown: Five pounds oak bark, four pounds fustic, fourteen ounces of logwood. Use alum water to make it permanent.

To color orange: For five pounds skin, muriate of tin, three ounces; ox gall, four ounces; boil and dip one hour; then add fustic, two and a half pounds; boil ten minutes and dip one-half hour, and add again madder, one teacup, and dip again one-half hour. Cochineal in place of madder makes a much brighter color; add in small quantities about two ounces.

To Clean Sable and Mink Furs.—In order to have the skin free for treatment, the first thing to be done is to unpick and take out all silk lining, wadding, etc., that may have been used in making up the muff or tippet. Then take one gallon of water, half a pound of white or best mottled soap, and a handful of bran. Cut up the soap and boil it in the water until it is dissolved;

then let it cool till nearly lukewarm, and mix in the bran. With this fluid almost any kind of fur may be cleaned.

A honeycomb sponge is the best material to use in applying the fluid, the object being to cleanse the fur without wetting the skin more than can be avoided. Having cleaned the fur with this fluid, still warm, it must next be thoroughly rinsed with clean water, well blued in the usual way. The same sponge will do for this purpose as was used in the first instance.

After this treatment, the fur must be dried as quickly as possible, but not before a fire, unless at some distance from it, shaking the skin repeatedly while it is drying, to prevent the hair from matting together. If the skin has become wetted by the operation, and dries hard, it must be rubbed soft before making up.

Finally, the fur will require a good deal of brushing to bring the hair once more to follow the grain of the skin. Another and more simple way of partially cleaning fur is merely to brush it, using dry pipe clay on the brush. This method, however, is better suited to keep fur clean when it is so, than to renovate it when it is much soiled.

Making up Furs.—The novice cannot learn half so well from printed hints how to make gloves, collars, etc., as to use an old article for pattern. By carefully cutting the seams of a used up pair of gloves or a collar, those which were good fits, the new skins may be cut by the different parts, and sewed together so as to make sightly articles of wear.

How to Tell Good Furs.—When examining skins for making up, or when purchasing fur garments, a good test as to quality is to blow briskly against the incline or set of the fur. If the fibers open readily, exposing the skin to view, reject the article; but if the down is so dense that the breath cannot penetrate it, or at most shows but a small portion of the skin, the article may be accepted.

Care of Furs.—Ladies, as a general rule, imagine that care in putting away furs is all that is required; they think they can wear them when and how they please, provided they expend a few cents for camphor when they lay them aside. This idea should be corrected. More harm is done to furs by wearing them for a week after the weather has become warm than during the whole season.

When they are put aside they should be brushed the right way with a soft brush, an old linen handkerchief folded smoothly over them, and a piece of gum camphor kept in the box all the time, or put them in a close box, and with good paste or mucilage fasten a strip of paper over the crack left between the lid and box and put them in the closet. The fall will find them safe and free from the unpleasant odors that tobacco, camphor, etc., always leave in furs.

Another very good way is to put the furs in a paper sack, tied up closely, so that the most minute fly cannot reach them. Put them in a dark place, and they will come out in good condition when needed.

How to Repair a Muff.—When muffs are bought they are often lined with cheap silk, that soon wears out. To repair them take some broad ribbon, brown for an elderly lady, scarlet or crimson for a girl. Take a piece of soft, red flannel, for the inside of the muff, and place the ribbon lining on it so that it will bring it just the right length and width when sewed in. Sew it up and have it all made neatly, ready to put in and sew around the edges. Use fine, silk thread, the color of the lining.

Pin it in place before commencing, else it will draw unevenly. If the tassels are worn out and beyond being respectable, take a bit of ribbon two inches wide, the color of the lining, and make a bow with ends and fasten on where the seam comes together.

MANAGEMENT OF KID GLOVES.

Selecting Kid Gloves.—In selecting kids, it should not be the object to obtain a thick or very thin pair, those of medium thickness usually being the toughest and best. Much depends upon the condition or kind of leather; if soft, oily, and will stretch easily, they usually wear well. By saying that much depends upon the kind of leather, I mean the kind of animal from which the skin was taken, although the matter cannot be determined by all when examining the gloves; so perfectly has the art of tanning rat skins made them imitate the real kid that none but experts can detect any difference. The skins of the Siberian rats, the sewer rats of Paris, the common wharf and house rats are used.

The process of cleansing, bleaching and dyeing rat and kid skins are so similar, that by the time the two kinds are placed beside each other in the same box, the affection for the young goat and the repugnance of the rat are entirely forgotten.

How to Put on Kid Gloves.—When purchasing gloves, people are usually in too much of a hurry; they carelessly put them on, and let them go in that way *then*, thinking to do the work more completely at another time. When this is the case a person is sure to meet with disappointment, for as the glove is made to fit the hand the first time it is worn, so it will fit ever after, and no amount of effort will make a satisfactory change.

Never allow a stretcher to be used, for the gloves will not be likely to fit as well for it. All of the expansion should be made by the hands; if the kids are so small as to require the aid of a stretcher, they should not be purchased, as they will prove too small for durability, comfort or beauty.

When selecting gloves, choose those with fingers to correspond with your own in length; take time to put them on, working in the fingers first, until ends

meet ends, then put in the thumb, and smooth them down until they are made to fit nicely.

A glove that sets well will usually wear well, at least will wear better than one of the same kind that does not fit well. When the ends of the fingers do not come down right, or when they are so long as to form wrinkles upon the sides of the fingers, they will chafe out easily. Where the stretcher has to be used to make the fingers large enough, the body part will be so small as to cramp the hand so that it cannot be shut without bursting the seams of the kids.

Some recommend putting new kid gloves into a damp cloth before they are put on, and allowing them to remain there until moistened. With this treatment they can be put on much easier than otherwise, and will fit very nicely until they get dry; but on second wearing there will be an unnatural harshness about them, wrinkling in spots, and they will not set so perfectly as at first. I have tried the dampening process, and do not approve of it.

Put on your right glove first. Then you have your left hand ungloved to button your right with. If you put on your left glove first, you have to button your right glove under disadvantage.

Care of Kid Gloves.—When gloves are removed from the hands they should not be wadded up and laid away in that condition, for they are very much injured in appearance by such treatment. It is a very common practice to place the gloves together and turn one of them inside out over the other, or to wad them up and cram them into the pocket. With such use they never can be made to set or look well upon the hands, there being a rough, wrinkled appearance which shows as much to disadvantage as would any cloth garment ‘mussed up’ in the same way.

As soon as gloves are taken off, the fingers and hands should be smoothed out nicely, and the pair laid away in that condition; if they are damp, let them dry upon the hands, rubbing them lightly during the time.

Where they are to be carried in the pocket straighten them out, lay the insides together, and roll them from side to side, and put them into the pocket with fingers up.

Injury to kid gloves from perspiration of the hand in hot weather will, it is said, be prevented by applying ordinary corn starch dry to the hands before drawing on the gloves. Certainly so easy a remedy will find many to try it.

How to Mend Kid Gloves.—Mending should be done as soon as there is a fracture; the old saying that “a stitch in time saves nine,” is more fully verified in kid gloves than almost any other article or garment of wear.

Where a seam bursts open it may be mended by the common over and over stitch, but where a fracture is made in the leather an altogether different treatment is required to make the repair a substantial one. In mending, silk thread of the same color of the gloves should always be used.

Where the leather has been torn, first sew around the edges with a button-

hole stitch, then draw the fracture together by cross stitch, merely catching the thread into the first stitches made. In this way gloves may be mended so as to possess as much strength as at first; but sewing into the leather with single stitch will not avail much.

Benzine for Cleaning Kid Gloves.—Benzine is used very extensively, and is good for extracting grease and stains, but should not be used upon purple or other very delicate colors, for the dyeing is not usually permanent enough to stand benzine, and sometimes will give way to the alcohol and ammonia. Buff will stand either of the above. The best manner of applying these cleansers is to put the kids on, and wash the hands until the dirt is removed, then work them dry by rubbing one hand over the other.

Where the gloves are not cleaned upon the hands, they should be spread out upon three or four thicknesses of cloth, and the leather rubbed toward the fingers; it is always the best way, however, to do the cleaning with the kids upon the hands, keeping them there until dry. When washed in this way, every part may be successfully reached. Keep away from the fire or a lighted lamp while using the benzine.

Milk for Cleaning Kid Gloves.—One of the safest and best processes for cleaning kid, either gloves or infants' shoes, especially the light blue shade, is sweet milk and Castile soap. Rub the gloves thoroughly with a flannel cloth which has been first dampened in the milk and then coated with the soap, then use a clean flannel dampened only, and dry carefully. They will be found to have nearly if not quite the original polish.

Alcohol Preparations for Glove Cleaning.—Alcohol and ammonia, equal parts, are good; the gloves should be rubbed after washing until entirely dry. Alcohol and camphene mixed, equal parts, is also used. Lay the gloves on cloth and first rub the surface gently with the solution, then dip each glove into a cup containing the liquid, lift it out, squeeze it in the hand, and again rub it gently with the sponge, to take out all the wrinkles. After this, gather up the cuff in the hand, and blow into it to puff out the fingers, when it may be hung up with a thread to dry. This operation should not be conducted near to a fire, owing to the inflammable nature of the camphene vapor.

Soap for Cleaning Kid Gloves.—Such a soap is made by compounding three ounces of good hard soap, melted in one ounce of warm water, one ounce of hyposulphite of soda, and one drachm of liquid ammonia. This liquid is applied to the stretched glove by means of a piece of flannel.

Coloring Kid Gloves.—The different modes of dyeing are as numerous as those of cleaning, but not as reliable; in fact, it is not well done outside of the regular establishments for the purpose, even the professional cloth dyers do not attempt the work. Kid gloves may be colored by any one, but there is a decided difference between merely coloring, and putting on the elegant finish which is given by those who have become professionals in the art.

When the gloves have become chafed or spotted, the appearance may be improved by touching the spots with ink or any other coloring substance of same shade. Sometimes, when they have become dingy, especially black, and look as if needing dyeing, they may be greatly improved by taking common table or salad oil, and adding to it enough ink to give it the complexion of the kid.

A few drops of black ink in a teaspoonful of oil will be sufficient for redressing a pair of black kids several times. Apply lightly with a feather and let the glove dry.

Black Dye for Gloves.—Steep three handfuls of logwood chips in an earthen vessel until the strength is well extracted; add a little copperas and a little alcohol. Put the gloves on the hands, brush over with the mixture, and rubbing gently let them dry there, which they will soon do. If not black enough brush over a second time and dry as before.

Form for Dyeing Gloves.—When one objects to doing the coloring with the kids upon the hands, they should be put upon wooden substitutes, or something that will fill out the leather; the cheapest substitute being sticks cut in shape and size to fit each of the fingers and thumb, and then a form to draw the hand part upon; but one piece need be used at a time.

Almost any fast dye may be used; brush over the leather with the coloring material; let it dry; repeat three or four times; brush off the superfluous material collected upon the surface of the leather, and when dry rub with a smooth stick, and then wipe over with a sponge wet in the white of an egg.

KNIT ARTICLES.

Knitting and Crocheting.—“Ladies who are fond of knitting and crocheting are often prevented from making the pretty things they see by not knowing how to shape the article. They recognize the stitch of the cloak, cape or hood at the first glance, but how can they shape the garment to make it set snugly and stylishly, unless by a happy chance some friend has one of the kind to lend for a pattern? ‘Even the printed directions are often so vague,’ they say, ‘not telling how many stitches to put on a needle, or how long a chain to make for a foundation, and no statements of the number of stitches after widening and narrowing, or of how much zephyr is required.’

“The directions are necessarily vague on these points, because if you wish, for instance, to knit a mantle for a girl of seven years old, it is clear that you must have more zephyr and a greater number of stitches than for one for a child of four; and then again, a knitted basque, which is considered lovely in shape by one lady will be pronounced hideous by another, and yet the same stitch and

general directions for making it would suit equally well for another shape that the latter lady would consider exquisite.

"The best plan is to obtain from some pattern bazar the exact shape you desire, cut the garment out of lining muslin and fit it nicely to the figure, and you have an accurate pattern for your knitting and crocheting, and can tell by measurement how many stitches to begin with, and where to widen and where to narrow.

"If you are not sufficiently practiced in such work to make an estimate of amount of zephyr required, take your muslin pattern to the store where you purchase your wools, tell them the stitch you intend to use and whether it is to be knitted or crocheted, and they will give you the number of ounces required. If you live at a distance from the store, send exact measurements and descriptions in place of the pattern."

Child's Knit Skirt.—Use two bone or wooden needles about three times the size of common knitting needles. To make a skirt for a child of five years, cast on sixty stitches of Germantown yarn for a front breadth and eighty stitches for each side breadth.

Knit first row plain, second row seam, third row plain, fourth row knit first two stitches together, then two stitches singly, thread before needle, knit one stitch, thread before needle, knit three stitches, take off a stitch, knit a stitch, bind; continue so across the row. Fifth row seam; sixth row like fourth row. Then knit across plain, then knit across seam, then knit across plain, then repeat from fourth row. This makes a wave-like border, which can be knit as wide as desired for the bottom of the skirt. The top is simple ribbing; two stitches plain, two seam. A lady's skirt has one hundred and twenty-two stitches on each breadth.

Another pretty plain border for skirts is the checker-board design. For a child's skirt cast on one hundred and eight stitches for the front breadth, and fifty-four for each of the two back breadths. Knit ten rows plain, eleventh row knit two stitches together, thread in front of needle, two stitches together, thread in front of needle, and so on the entire row. Then knit ten rows plain, one row seam, one row plain, one row seam. For the next row knit six stitches plain, six seam, six plain, six seam entirely across the needle.

This commences the checker blocks, and the succeeding five rows are knit in the same manner, being careful to reverse the seaming so that plain stitches come above plain, and seam above seam. You now have one set of blocks complete, when you may proceed in same manner to knit another set, having them alternate with the first; seam stitches above plain and plain above seam. Five sets of blocks make a nice width border.

If on first reading, these directions seem complicated, it will not take long to knit a trial strip, casting on half or quarter the number of stitches, and by following these specifications the result will be sure to be satisfactory.

To Knit a Sofa Afghan.—First in giving directions for making this afghan, the combination of its colors being particularly rich and uncommon, it will be necessary to state what they are. Get of single zephyr some black, the darkest, and a bright shade of scarlet, three shades of orange, the darkest of which will blend with the bright scarlet, a lemon color, and white—eight shades in all.

Crochet of the black a chain two yards long, turn and knit seven short stitches, in the eighth stitch of the chain putting three stitches; then knit seven more short stitches, skip two of the chain, knit seven, in the eighth knitting three, and so on until the end of the chain is reached, thus forming it into points. Each successive row is composed entirely of short stitches, no other kind of stitch being employed in the body of the afghan.

The second row and all others are merely a repetition of the first; two stitches being skipped where they are in the first, and three being knit into the center of each cluster of three in the first; the stitches of each row are taken through the outer half of those of the preceding. Knit three times across with the black zephyr and also three times across with each of the other shades in the following order:

Next the black use the darker scarlet, then the bright scarlet, the darkest orange followed by the two lighter shades, the lemon and the white. These twenty-four rows form what we will term the first stripe of the afghan. The second stripe is commenced with black zephyr, the other shades following in the order described above. In this combination of colors, the black and white being side by side, is very effective.

Five stripes complete the body of the afghan, two sides of which have straight edges, and two pointed ones. The straight edges are finished with a scallop, and the points are left without finish, unless a tassel attached to each is liked.

The quantity of material necessary, if Germantown zephyr is used, is two skeins of each shade. If Berlin zephyr is preferred, it will take five ounces of each shade. The Germantown looks just about as well, and is less expensive.

This afghan is beautiful made of all the shades of scarlet, from the darkest to the sea shell tint; next the lightest shade crochet three rows of dark scarlet filling silk, finish the edge all around with a chain stitch in silk, and provide each of the points with a silk tassel.

Infant's Knit Shirt.—The material required is one ounce of white split zephyr, or of Saxony yarn. It is knit upon two gutta percha needles two sizes larger than ordinary steel needles—the latter may be used if it is desired to have the work very close and fine before washing.

Set up eighty-one stitches and knit one plain row. The next row begins by narrowing one stitch; knit three stitches, then throw in the thread and knit one—this is to widen—throw in the thread again and knit one, then knit two and take, on the right hand needle, one stitch from the left. Now narrow one

and bind ; that is, drop over the stitch you have just narrowed, the one you took from the left hand needle.

Repeat all of the above to the end of this row, then knit across with one plain row and back with another, preserving the right and wrong sides of these two rows, which complete the scallop. Repeat the three last mentioned rows until a piece of sufficient length is knit. Knit another of the same size and join the two at the side edges to within a few inches of the top, which leave open for inserting sleeves.

The sleeves are knit with a row of scallops at the lower edge, and are ribbed for the top part. Finish the neck, after sewing in the sleeves, with a crotched scallop and insert a ribbon to draw it into shape.

Double Knit Scarf.—Two colors, blue and white. Cast on thirty-six stitches in blue, first row ; bring the wool forward, slip one, pass the wool back, knit one ; repeat to end of the row. Each succeeding row is the same, observing that the knit stitch always comes under the slip stitch. It will require seven rows of blue, seven of white, seven of blue, thirty-eight of white, seven of blue, seven of white, seven of blue. Cast off and draw up the ends. Finish with blue and white tassels.

To Knit Diamond Edging.—Cast upon one knitting needle nine stitches. Knit three stitches, narrow once, put thread over once, narrow, thread over, knit one stitch, thread over, knit one. Knit back seam. Knit two stitches, narrow, thread over once, narrow, thread over once, knit three stitches, thread over once, knit one. Knit back seam. Knit one, narrow, thread over once, narrow, thread over, knit five stitches, thread over, knit one. Knit back seam or plain. Knit three stitches, thread over once, narrow, thread over once, narrow, knit one stitch, narrow, thread over once, narrow. Knit plain or seam. Knit four stitches, thread over once, narrow three stitches together, thread over once, narrow. Knit back seam or plain. Knit five stitches, thread over once, narrow three stitches together, thread over once, narrow. Knit seam back if you want a right or wrong side.

Knit Spread for a Light Stand.—Cast on wooden needles one hundred and twenty-seven stitches. Take off the first stitch, calling it one, thread over once, narrow two stitches together, which counts three, thread up over once, knit two which count three, and so on clear across. Seam back plain. Knit back plain. Seam back on the wrong side, making three times between the eyelets. The coarser the needles and yarn the more showy the work.

To Crochet House Slippers.—Material required is three ounces of double zephyr. Commence the slipper at the toe. Make three chain stitches, then knit back with a single crochet, commencing in the very last chain made. Into the center one of the three chains put three single crochets for widening.

This row contains five single crochet stitches, and the entire front of the slip-

per consists of successive rows of single crochet, knit from right to left, each row commencing on the last stitch of the preceding, always knitting three single crochet in the center to continue the widening.

The size of front must be ascertained by measurement upon the foot, or cork insole which it is designed to use. When large enough commence another row, knitting ten stitches; turn and knit back on these ten. [This is the beginning of back part of slipper.] Narrow one stitch at the top of next row, and after a plain row, narrow again at the top. You now have eight stitches.

Continue knitting from right to left six, eight or ten rows, according to the size desired. Then from this point, until the middle of the back of the heel is reached, widen—by putting two stitches into one—every other row at the top. This completes one-half of the back. Break the worsted, take up ten stitches on the opposite side of the front and proceed with this last half as with the first, joining the two at the center of the heel with a row of single crochet.

The slipper thus far presents a ribbed appearance caused by knitting each stitch into the outer side of those of the preceding row. Be careful to do this.

How to Put on Slipper Sole.—Make the upper enough shorter than the sole to require stretching when it is sewed on. Finish the top edge of the crocheted part with a scallop, first making a row of double crochet (long stitches) with two chain between each two stitches. Sew this upper in button hole stitch with strong silk to a cork insole of the required size.

A more durable way, however, is to stitch around the sole a piece of fine alpaca braid of the exact shade of the zephyr used; then sew on the upper and finish by neatly binding to it the free edge of the braid.

The finishing touches to the entire slipper consist in inserting a rubber cord just below the scallop for the purpose of holding it close around the foot; also in the same part insert a worsted cord furnished with small balls at the ends and tied in a bow knot on the front of the slipper. To invalids and for tender feet these slippers are a special comfort, being warm and easy as a stocking.

Greek Crochet Cap.—This is made of coarse chenille. Begin at the top with a chain of six or eight stitches; unite the ends and work in rows round and round, increasing a sufficient number of stitches in each row to keep the work flat, until it is about eight inches in diameter.

The sides may be worked in open crochet, introducing a few plain lines of black and gold between each two rows of open crochet. The best colors for a cap in chenille are black and gold—dark blue, black and gold, or claret, black and gold.

How to Knit Suspenders.—Material for one pair of suspenders: Two balls of fancy colored wrapping twine, such as druggists use for tying up parcels; two large sized knitting needles, such as are used for knitting woolen hose. Cast on twenty stitches, knit the first stitch, turn the thread around as if to seam, take off the next stitch without knitting, turn back the thread, knit the

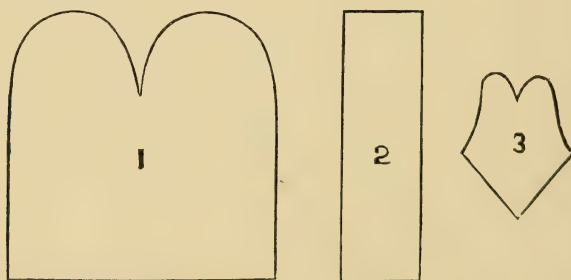
next, take off the next the same as before, continue to knit in this manner until you have a strip two inches long; this is for the narrow end which slides into the buckle.

For the wider part knit the first stitch as before, bring the thread round, take off the stitch the same as if seaming, then instead of turning the thread back bring it over the needle, you will then have a stitch and loop, both resting on the knitting needle. Knit the next stitch, take off the next the same as before. Thus do until all are knit, you will then have a single and double stitch for every alternate one. If the buckles are wide knit all one width.

In knitting the next time across, take off the single stitch and knit the double one. Every time the single stitch is taken off, the thread must be passed over the needle to make a double one of it. That is all. Knit the required length, then knit the end the same as the beginning, only adding a button hole; this is done by dividing the stitches and knitting up half, then dropping down the thread and knitting up the other half; then knit six or eight times across and bind off.

The two narrow strips which fasten to the buckle holding the suspender and also attached to the pants, can be made of leather or knit like the ends of the suspender, just as you choose. A pair of buckles taken from an old pair of suspenders will complete the list of materials; fasten them properly and they are ready for use.

To Knit Rag Mittens.—Mittens are knit on wooden needles, size of circumference one-third less than a common lead pencil. Two only are required, as the mittens are knit in several pieces, and afterward sewed together, to become complete. Half worn flannel rags are best for knitting. Tear in strips, one-half inch wide, or less if you can, lap the edges when sewing so as to leave them smooth.



THE DIFFERENT PARTS OF A KNIT MITTEN.

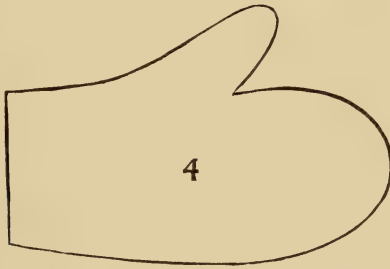
To Knit the Thumb.—Commencing at side of the piece (fig. 33, cast on one stitch, knit, cast on another stitch, knit the two, cast on another stitch, knit the three. The stitch first made being in the middle, the new ones on either side.

Now cast on five stitches, knit back, making another stitch at the opposite end.

(In making new stitches they must always be cast on the outer edge, so as to be the first ones knit, when returning back and forth.) Knit back and forth, making a new stitch at each end, until two have been cast on, at the point of the thumb, always making a new stitch when reaching the lower part of the thumb piece, until the thumb piece is half done.

Knit back and forth once, without making a stitch at the upper point, then back and forth again, until the two have been bound off, one at each time, reaching the upper point. The thumb piece will then be half done.

Bind off one stitch at a time, as the knitting proceeds at the lower point, instead of making new ones, as was done in directions for first half; proceed with upper point of thumb the same as in given directions; at the last bind off five stitches, leaving three for gusset; knit, bind off one on either side, leaving one for the last; draw the last stitch, and the thumb is completed.



SHAPE OF THE KNIT MITTEN WHEN COMPLETED.

For the hand part (fig. 1) cast on twenty-four stitches, knit back and forth, making a new stitch every time the upper part of the hand is reached, until four stitches have been added, then knit across four times without widening. Continue the knitting until the four stitches have been bound off, when half the hand part will be done.

Knit the other half; bind off; sew the hand part by doubling the halves together. After the thumb pieces have been sewed together, insert the gussets about half way in the open space of the hand part, letting the lower part of the thumb point extend down to the wrist.

For the wrist (fig. 2) cast on eight stitches; knit a plain strip long enough to reach around the lower part of the mitten. Or a wrist can be crocheted on.

A Knitted Cape.—Use three-ply fleecy wool, and number twelve needles. Put on thirty-five stitches; knit eight times across straight, then thirty-six times across, increasing one stitch on one end each row. Decrease one stitch for twenty-one rows on the straight side to form the back part of the neck, still increasing on the other side. Then knit twelve turns quite straight—the center of these twelve turns is the center of the pelerine, and the other side must be knitted inreverse,

TO MAKE A PIN BALL.

Material Required.—A lady correspondent has furnished me with her style of making a very pretty and convenient article for the home. The material required is one-fourth yard each scarlet merino and white muslin, one ounce scarlet Berlin wool, bran or sawdust for stuffing, bone crochet needle, darning needle, and a small sheet of pasteboard.



FIG. 1.—PIN BALL PATTERN.

Cutting and Shaping.—Cut of muslin five pieces shape of fig. 1, seven inches long and two and a half inches wide. Baste very neat, even seams, and stitch on sewing machine, leaving an opening of two inches in one seam. Turn right side out and stuff very compactly with bran or sawdust. Then close the opening with over and over stitches.

Cut of merino five pieces same as before, seam with scarlet spool silk, leaving one seam entirely open. Then draw the merino cover over the muslin form, close up the open seam with scarlet silk and fasten the merino cover firmly and neatly at the pointed ends. Then crochet a long chain of Berlin wool; with scarlet silk sew it (with false stitches) from the points passing over every seam. This holds the cover firmly and gives a finished appearance.

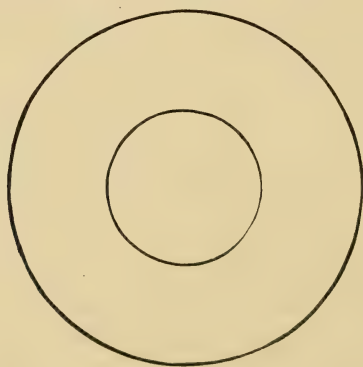


FIG. 2.—PIN BALL TASSEL BOARD.

To Make Tassels.—Cut twelve circles of pasteboard the size of fig. 2; out of each cut a smaller circle as represented. Then having placed a long

double thread of the Berlin wool in your darning needle, hold two circles of the pasteboard together with your thumb and forefinger and pass your threaded needle over and under, winding until the smaller circle is completely filled.

When you have filled the twelve circles in this manner (using two each time), crochet another long chain of the Berlin wool; thirty-six inches is long enough. Then with a pair of sharp pointed scissors cut around the outer edge of one of the covered circles, passing one end of the chain in between as you cut, and tying it firmly when the circle is cut all around.

Draw out the pasteboard by tearing carefully, and you will have a handsome tassel. Trim a little, if necessary, for smoothness. Arrange a tassel on the other end of the chain in the same manner. Then leaving a length of six inches, fasten chain at pointed ends of ball.

Crochet another chain fourteen inches long and make a tassel for each end as before; fasten this immediately in the center of first chain at the top where you design hanging it up. Then crochet two shorter chains, each six inches long, make a tassel of your two remaining circles and attach one to each of the pointed ends. Your ball is now complete.

Rickrack Daisy Cushion Cover.—Rickrack daisies are exceedingly pretty and are made of the medium fine braid, laid in a circle as large as you wish the circumference of the daisy, and its center is then crocheted of gold silk; row after row of short stitches until the space is filled.

Sew the daisies together in square or diamond shape, and lay over the top of a blue satin cushion, adding a large satin bow at each corner.



BUTTER AND CHEESE MAKING.

Management of Milk.—The importance of a cool, sweet, airy place for keeping milk is not generally realized by housewives. Milk and cream will absorb odors from the bad air that abounds; so the first principle in butter making is to have a part of the milk room in a current of air, and in the coolest location which the house affords. Even when the situation is all that can be desired, unless the dairy woman skims the milk at exactly the right time, and keeps the pans and milk pail as sweet as roses, she will fail to produce “gilt-edged butter.”

If the milk stands in the pans until the small spots appear on the surface of the cream, good butter cannot be made. Cream taken from milk just before it turns to clabber, makes the sweetest and most deliciously flavored butter. Skim the cream whenever the milk has turned acid, whether it takes twenty-four, or thirty-six, or forty-eight hours to make it so.

Management of Cream.—As the cream is removed, put it into stone jars and add to it one tablespoonful of fine salt, and after skimming stir up the whole contents with a silver spoon. A much better quality of butter is made from cream which has been kept in the jar not more than three days; and when one possesses a large enough dairy to churn the cream every morning, the butter is always preferable.

Cream that is kept too long can never make a respectable quality of butter, for it possesses a flavor which no one accustomed to a good article can endure. A strong current of air should never pass directly over the cream, as it turns it into a tough, skinny substance, which cannot make a good article.

It should be kept at a temperature not above 65 degrees, nor below 50 degrees, and frequently stirred—say night and morning, or every time additions are made to it—and the vessel containing it should always remain open to allow perfect ventilation. By no means must it be allowed to dry or mold on the surface, nor must it get too sour.

Churning Butter.—During the process of churning, not only a certain uniformity of temperature is recommended to prevent the butter being soft and spongy, but, it is claimed, the agitation of the cream must be regular, neither too quick nor too slow.

If the agitation is too quick, the butter will make and unmake itself before the churner is aware of it, as too rapid motion induces fermentation, which, when it has reached a certain point, is entirely destructive of anything like the possibility of making even moderately good or well tasting butter.

If, on the other hand, the motion be too slow, the agitators in the churn fail to produce the desired separation of the component parts of the cream, and the consequence is, that after a good deal of time spent in lazy action, the churner is just as far from his butter as he was at the beginning of his labors.

The temperature for the cream in churning should be from fifty to sixty degrees; fifty-six to fifty-eight are best. If the cream is too warm when put into the churn, it may be tempered by the use of cold water in the cream. This practice does not in the least extend the time of churning; but if the cream be quite thick, it favors the agitation and facilitates the operation.

Much of the bad flavor of butter proceeds from the neglect to properly cleanse the churn, pans or other utensils used, from the sour milk. Sometimes churns become so saturated with it that sweet butter cannot be made in them. A wooden churn should frequently be filled with lime water or weak lye to sweeten it and eradicate the bad odors that have become absorbed into it, or left in some crack of the churn or dash.

Working Butter.—In working butter temperature is an important thing. There is also danger in overworking. If worked too much, or at a temperature much above 65 degrees Far., it spoils the grain and makes the butter waxy and greasy. The object of working is to free it from buttermilk, and afterward mix

in the salt. The knack is to get out the buttermilk with the least working—or the least injury to the butter globules.

Washing Butter.—There is a good deal of dispute regarding the propriety of washing butter. A lump of butter entirely made of unbroken globules can be freed from sugar and casein by washing. Water easily penetrates into the granular, ungreasy mass; the fermentative agents are removed; the butter will not spoil. This does not happen after hard churning, because churns break the globules more or less by heat friction or stroke.

When a broken globule sheds its contents, the butter, being minutely divided in a liquid state, absorbs or combines with atoms of sugar and casein which are in solution, and therefore minutely distributed. No washing is able to disintegrate atomic agglomerations within a greasy substance; water runs off from it; in such a case carrying away coarse membranes and flavor of the butter.

Keeping Butter.—After the butter is worked free from buttermilk, it should be salted to taste—it is generally oversalted—and balled or packed at once, according to the use to be made of it. If packed, a good way is to put it into a clean, glazed jar, and cover with a brine made from rock salt.

Never put balled butter in a close place where other eatables are kept, especially if they are warm. Equally deleterious as to results is the practice of putting a plate that has been used for culinary purposes—until it has absorbed stale odors—over a crock or tub containing butter.

The best and safest covers are clean muslin cloths. Place the packages containing butter where the air comes fresh from all outdoors through raised windows.

Double Curded Cheese.—One general system is adopted by all in the manufacture of cheese, yet there is variation enough, in what might appear unessential parts, to widely vary the quality of the production. It has always been considered an easy matter to make a good single curded cheese from sweet new milk, but somewhat difficult to manufacture a first class article from two curds. The trouble has arisen from failing to get the old and new curds so worked together as to make the cheese of even texture, and pleasant flavor.

Having had a number of years experience in manufacturing double curded cheese, and having succeeded in making an article that brought the highest market price of any produced in the United States, I give my method of making:

To Work in the Cream.—The milk is set in the vat and kept cool during the night, and the cream taken off in the morning, to which is added enough warm water to thin it sufficiently to pass through the milk strainer, and returned to the vat before the morning's milk is put in. Hot water should never be used to thin the cream, for it will melt the cream and the oil will pass off with the whey.

Heat in Cheese Making.—The milk is heated to 85° by the thermometer (never guess at it), and enough rennet put in to coagulate the milk in thirty

minutes. The curd is cut and allowed to stand until the whey rises up around the sides of the vat, and spreads over the surface, then the heat is gradually increased, and the whey carefully worked off until the thermometer denotes 105°.

Managing Cheese Curd.—The scalding is continued without further increase of heat until the curd is worked up fine, and the pieces will not show a milky appearance when broken open. Care is always taken when working the curd not to handle it severely enough to change the whey from a clear transparent green to a milky color.

After the curd is sufficiently scalded, all of the whey is drawn off, and the curd worked up until cool, dry, and the particles as fine as wheat kernels; then a common sized teacup full of salt is put into every fifteen pounds of curd.

The curd is kept until the next morning in a wooden bowl, covered with a cloth, and stirred once or twice during the time to keep it from packing. After the second curd has been prepared as the first, and ready to take from the vat, the two are thoroughly mixed and put into the press.

How to Press a Cheese.—Very many cheeses are spoiled by wrong management when pressing; the weight should be put on lightly at first, and gradually increased until all the whey is out, then any amount of weight will do no harm.

If a heavy pressure is put upon the curd when first put in, the whey is forced to the center, a rind formed on the exterior, and the consequence is a leaky cheese. After being pressed from four to six hours, the cap is put on, the cheese turned, and kept in until the press is wanted for the next curd.

Curing Cheese.—As soon as the cheese is taken from the press it is placed where a current of air cannot strike it, for if the wind is allowed to blow upon it but for a few moments fine checks will appear in the rind, giving the skipper fly a chance to make her deposits.

As soon as the cap head is sewed or pasted on, the cheese is greased thoroughly with hot lard or whey butter, containing enough yellow ochre to give it a rich color. All of the cheeses in the dairy house are rubbed and turned daily, and greased as often as they appear to require it. See page 343.

Skimmed Milk Cheese.—A model housewife furnishes the author of this work with the following on making skimmed milk cheese: "My plan is to make cheese and butter, both. I wait until I gather about thirty panfuls of milk. These I skim, then turn the milk into my large brass kettle over our furnace, and add one batch of new milk fresh from the cows. I then heat all slowly, stirring often so that the milk may not scorch on the bottom of the kettle, which it is very liable to do unless cared for.

"When the milk is a little more than blood warm, I remove the fire from under the kettle. Set the milk with rennet—using usually about one and one-half teacupful of the liquid.

Preparing Rennet.—"When I put my rennet to soak, which should be done several days before it is wanted for use, I add one large double handful of sage leaves with warm water, about one quart of water to one rennet.

Extracting Whey.—"After the rennet is added, stir the milk gently for five minutes, then let it stand until the whey rises on top of the curd fully an inch deep. I then take a long, thin bladed knife, one which reaches to the bottom of the curd, and cut it in thin slices about an inch square, after this I let it rest ten or fifteen minutes, then break the curd gently with the hands.

"The breaking up causes the whey to rise to the top, and this must be dipped off and put on the stove to heat, and when all the whey has been subtracted from the curd—which can be done by spreading a thin cloth over the curd and dipping off the whey as it is pressed through—the whey which has been heated only to a scalding heat can be poured over the curd and stirred with the hand, until all parts are of the same temperature,

Scalding Cheese Curd.—"The great secret in having skimmed milk cheese soft and yielding is to not scald too much. I merely heat mine enough to harden the curd, so it will not fall to pieces when taken up in the hand.

"The next move is to prepare the cheese basket by placing the strainer over it, and putting the basket over a tub or barrel, and to dip the curd, whey and all into the basket, where it must be broken or cut very fine, salted and then put into the hoop for pressing.

Simple Cheese Press.—"Our press is a very simple affair. Merely a small keg covered with a board on which the cheese hoop sets. Directly over the center of the follower an upright standard is nailed to some stationary object above. Then some blocks are placed over the cross piece of the follower, and a long lever with a heavy weight attached to the further end is placed between the upright standard and the blocks or top of the follower. See page 454.

"Great care must be taken to get the cheese under exactly in the center, so it will press true. It should be turned in about half an hour after being put to press, then turned again in six hours. I use only one strainer to press with; this is removed when the cheese is first turned, and the cheese put back into the hoop without a cloth around it. Our implements used in making cheese are all home-made excepting the hoop, which is made of tin."

Keeping Cheese after Cutting.—"A cheese after being cut keeps best by placing in a wooden box with wire screens placed in the sides and over the top, thus keeping out all foreign substances but not excluding the air. A damp cloth spread over the surface where it has been cut will keep the cheese from drying, and no fears need be entertained about mold penetrating the interstices. By all means do not roll up the cheese in cloths and keep it from a circulation of air, if you wish to retain its flavor and have it improve with age."

To Make Tub Cheese.—"First prepare the curd the same as for making hoop cheese, then place it in a jar or tub of the required size, as solid as

may be with a follower to fit closely, and put a heavy weight thereon with cloth to receive the moisture, which should be changed as often as saturated.

"Each day's curd being thus managed until the tub is filled. Then take the whole mass from the tub into a cheese tub, and completely pulverize, adding more salt if necessary, thoroughly cleansing the tub and replacing the curd by pounding in as before, using the cloth as at first until dry, then butter the top, and filling in about the cheese as it dries with melted butter, covering the whole with a thin cloth tied over the top of the tub, and it is done."

SMALL ICE STORAGE.

Cheap Ice Chest.—There are numerous and very cheap methods of keeping small quantities of ice in the house. Where one does not own a refrigerator a good substitute may be made in the way of a cheap ice chest.

Procure two dry goods boxes, one about eight inches smaller than the other. Procure some thoroughly dry and clean sawdust, sift it and pack the space between the boxes therewith as solid as possible; making a cover (and packing it also) to shut tightly; put a small pipe from the bottom of the inner box to the outside of the outer one, to draw off the water as the ice melts.

On the inside box nail cleats on which to place racks made of lath. The ice is placed at the bottom, and whatever you wish to keep cool, such as butter, fresh meat, cream, etc., placed upon the racks. Such a box is also excellent to keep articles of food in, when there is no ice in it.

This box can be improved by putting in a zinc lining—old zinc will do—and by nailing legs to the outside corners so as to keep it from the floor a few inches. Bricks or blocks will answer also. Such a box will keep ice as well as a refrigerator that costs twenty-five dollars.

An Ice Pocket.—Make a double pocket of strong woolen cloth, no matter how coarse and faded it is. Have a space of two inches or so between the inner and outer pockets, and pack this space as full as possible with feathers. You have no need to use geese feathers; hens' feathers are just as good.

With a pocket thus constructed and kept tightly closed at the mouth, a few pounds of ice may be kept a week, it is said. This may often be convenient where ice is to be kept for a sick room.

Keeping Ice in a Blanket.—Wrap a block of ice in a blanket and hang it where there is but little, if any movement of the air. The ice will melt very slowly; in part, because the blanket is a poor conductor of heat, but chiefly because the water produced by the melting of the ice is largely or wholly evaporated from the outer folds of the blanket, and in vaporizing absorbs so

much of the heat received from the surrounding air that the temperature of the ice is kept low.

The inner folds of the blanket will be frozen to the ice ; the ice will remain dry and will seem to evaporate rather than melt.

Cheap Ice Pitcher.—Place between two sheets of paper (newspaper will answer, thick brown is better), a layer of cotton batting about half an inch in thickness, fasten the ends of paper and batting together, forming a circle, then sew or paste a crown over one end, making a box the shape of a stove pipe hat minus the rim. Place this over an ordinary pitcher filled with ice water, making it deep enough to rest on the table, so as to exclude the air, and you will be astonished at the length of time the ice will keep, and at the length of time the water will remain cold after the ice has entirely disappeared.

DISINFECTANTS.

Bad Odors and Disease.—There is no means more certain to bring disease upon the members of a household, than by allowing infectious matter to remain upon the premises. The offensive odors that arise from close, damp places, decaying vegetables in a cellar, unclean sinks, etc., are almost certain to engender some malignant disease, and those who neglect the proper use of disinfectants are the ones who suffer the penalty attached to the violation of an imperative, sanitary law.

To Disinfect Sinks and Drains.—Copperas dissolved in water, one-fourth of a pound to a gallon, and poured into a sink and water drain occasionally, will keep such places sweet and wholesome. A little chloride of lime, say half a pound to a gallon of water, will have the same effect, and either of these costs but a trifle.

A preparation may be made at home which will answer about as well as the chloride of lime. Dissolve a bushel of salt in a barrel of water, and with the salt water slake a barrel of lime, which should be made wet enough to form a thin paste or wash.

To Disinfect a Cellar.—A damp, musty cellar may be sweetened by sprinkling upon the floor pulverized copperas, chloride of lime, or even common lime. The most effective means I have ever used to disinfect decaying vegetable matter is chloride of lime in solution. One pound may be dissolved in two gallons of water. Plaster of Paris has also been found an excellent absorbent of noxious odors. If used one part with three parts of charcoal it will be found still better.

To Disinfect a Cistern.—To purify cistern water, take a pound or two—according to the amount of water—of caustic soda or a similar quantity of

concentrated lye, and put the same into the cistern ; this will disinfect the stagnant water, and cost nothing compared to the benefits derived. When using the concentrated lye dissolve it in warm water, and then pour it into the cistern, at the same time agitating the water of the reservoir.

To Remove the Smell of Petroleum.—Professor Stolba publishes what he considers the best method of completely removing from glass or other vessels the smell of any petroleum which may have been previously contained in them. This simply consists in introducing a suitable quantity of milk of lime and shaking it around thoroughly, and after allowing it to stand for a few minutes, repeating the operation. At the same time the external surface of the vessel is to be washed with a rag dipped in the same substance. Petroleum forms an emulsion with the milk of lime, and can thus be readily removed. If particles of thickened petroleum adhere to the glass, these can be removed by washing with fine sand, or by other mechanical means.

After emptying out the emulsion produced, it is only necessary to rinse with water, after which as much chloride of lime as will go on the point of a knife is to be introduced and shaken with water, and then allowed to stand about an hour, the exterior being rinsed off in a similar manner. If the liquids referred to are used hot, this operation will be materially facilitated.

To Deodorize Onion Kettles.—Kettles may be cleansed of onion and other odors by dissolving a teaspoonful of pearlash or saleratus in water and washing them with the liquid.

DOMESTIC MISCELLANY.

Cleaning Sofa Covers.—If the covers of sofas and chairs are dirty, they may be cleansed without being removed, by first washing them over with a flannel, then, before they are dry, sponge them over with a strong solution of salt and water, in which a small quantity of gall has been mixed. The windows of the room should be opened so as to secure a perfect drying, and the colors and the freshness of the articles will in this way be restored.

To Clean Straw Matting.—Take a pan half full of hot water, a perfectly clean, long handled mop, and a dish of dry, unsifted Indian meal. Sweep all dust off the matting, then scatter the dry meal evenly over the room. Wring the mop so dry that it will not drip at all, and rub hard, one breadth at a time, always lengthwise of the straw, and use clean water for each breadth. When the matting is dry, the meal can be swept off easily ; it should always be done on a dry day.

To Brighten Straw Matting.—Wash it in brine made by dissolving a pint of salt in a pail of water. It is said that the salt will keep the straw from turning yellow.

To Clean Oilcloth.—Oilcloth requires careful treatment, and should never be scrubbed with a hard brush and soap, but after first being swept with the long handled hair brushes that are made for the purpose, it should be carefully washed.

To ruin them, clean them with hot water or soap suds, and leave them half wiped, and they will look very bright while wet, and very dingy and dirty when dry, and soon crack and peel off. But if you wish to preserve them, and have them look new and nice, wash them with soft flannel and lukewarm water, and wipe them thoroughly dry. If you want them to look extra nice, after they are dry, drop a few spoonfuls of milk over them, and rub them with a small, dry cloth.

Another good way is merely to be rubbed with a flannel, and polished with a brush of moderate hardness, exactly like a mahogany table, and by this simple means the fading of the colors, and the rotting of the canvas, which are inevitably attendant upon the oilcloth being kept in a state of moisture or dampness, are entirely avoided.

They may also be cleaned with a mixture of magnesia only milkwarm, followed by warm water, in the same manner that carpets are cleansed. They should be rubbed with dry flannel until nearly dried, then wet over with a sponge dipped in milk, and immediately dried and rubbed with a flannel till the polish is restored.

This is a process much to be preferred to that of rubbing the cloth with wax, which leaves it sticky and liable to retain dust and dirt for a long time. Very hot water should never be used in cleaning floor cloth, as it brings off the paint.

To Cleanse Wool.—Put as much water in a tub or barrel as you want to use at one time; add salt enough to make a weak brine; then add to this a gallon or two of chamber lye; then dissolve enough sal soda to make a good suds when stirred, soft water is best, and the whole should be warmed.

Put in as much wool as your vessel will hold, and let it soak overnight; wash it out, rinse in clean, warm water, and your wool will be clean and white. Tanners and glove makers will find this the very thing to clean the wool on lamb and sheep skins, for gloves and mittens.

To Clean a Hoop Skirt.—When a hoop skirt is soiled, put it into a tub of hot suds, and rub it with a clean scrubbing brush or whisk broom. Rinse it and hang it in the sun. It will be whitened, but be a little stiffer than before.

Home-Made Stove Blacking.—Black lead well mixed with white of egg is a good stove blacking. Lay on with a paint brush, and when dry polish with a hard brush.

How to Select Flour.—First, look at its color; if it is white with a slightly yellowish or straw color tint, it is a good sign. If it is very white with a bluish cast, or with black specks in it, the flour is not good. Second, examine its adhesiveness—wet and knead a little of it between the fingers; if it works

dry and elastic, it is good ; if it works soft and sticky, it is poor. Third, throw a lump of dry flour against a dry, smooth, perpendicular surface ; if it adheres in a lump, the flour has life in it ; if it falls like powder, it is bad. Fourth, squeeze some of the flour in your hand ; if it retains the shape given by the pressure, that too is a good sign. Flour that will stand all these tests is safe to buy.

How to Select a Broom. — In buying a broom, choose one with greenish brush. See that the broom head does not shake on the handle ; if it does, reject it ; for the handle having been green when the broom was made, in sweeping the brush will keep falling out. Next, open the broom below the sewing, and see if there are any stalks. It should be clear brush ; for as the stalk of broom corn is brittle, if there are any below the twine, they will be continually breaking off.

To Hang a Broom.—Take a large ring, such as one uses in the back of a picture frame, costing about one cent, and screw it into the end of the broom handle ; then drive a lath or shingle nail, or what is better, a small hook, where you wish to hang your broom.

Management of Brooms.—If brooms are wet in boiling suds, once a week, they will become very tough, will not cut the carpet, last much longer and always sweep like a new broom.

Do not keep a broom before the fire ; the brush is liable to break, being so dry. The dampening lengthens out its days of usefulness. Do not store brooms where there are rats and mice, they like the corn. A broom that is all out of shape may be restored by soaking, then pressing into shape beneath something heavy.

Broom for Carpet Cleaning.—Set a pail of cold water out by the door, wet the broom in it, knock it to get off all the drops, sweep a yard or so, then wash the broom as before and sweep again, being careful to shake all the drops off the broom, and not sweep far at a time. If done with care it will clean a carpet very nicely, and you will be surprised at the quantity of dirt in the water. The water may need changing once or twice, if the carpet is very dusty.

Color for Kitchen Walls.—There is a prevailing fault existing in the selection of colors for kitchens, they being almost always dark, when they should be light, airy and cheerful. A light gray, or stone color, is desirable.

The use of yellow ocher in coloring the walls of rooms is condemned by the *Builder*. The occupants of such apartments, it says, invariably complain of pain in the forehead and eyes, often being unable to work. When the walls are cleaned of the ocher and whitewashed these ailments entirely disappear.

How to Light a Fire.—All housekeepers have at some time realized the difficulty of lighting a fire in a still, damp morning, when the chimney will not draw, and vigorous blowing proves ineffectual.

Science explains the trouble as “caused by the difficulty encountered in over-

coming the inertia of the long column of air in the pipe or chimney by the small column of air that can be forced up through the interstices of wood and coal, at the bottom of which the fire is kindled."

This may be remedied by first lighting a few bits of shavings or paper placed upon the wood ; thus, by the heated air forcing itself into the chimney and establishing there an upward current, the room is kept free from the gas or smoke which is so apt to fill the room, and the fire can then be lighted from below with good success.

Kitchen Measurements.—One quart of wheat flour is one pound.

One quart of corn meal weighs eighteen ounces.

One quart of butter, soft, weighs fourteen to sixteen ounces.

One quart of brown sugar weighs from a pound to a pound and a quarter, according to dampness.

One quart of white sugar weighs one pound.

Ten medium sized eggs weigh one pound.

A tablespoonful of salt is one ounce.

Eight tablespoonfuls make a gill.

Two gills, or sixteen tablespoonfuls, are half a pint.

Sixty drops are one teaspoonful.

Four tablespoonfuls are one wineglassful.

Twelve tablespoonfuls are one teacupful.

Sixteen tablespoonfuls, or half a pint, are one tumblerful.

To Curl Hair.—Take two ounces of borax, one dram of powdered gum senegal, one quart of hot water (not boiling), mix, and as soon as the ingredients are dissolved, add two ounces of alcohol strongly impregnated with camphor ; on retiring to rest, wet the hair with the above mixture and roll it in paper as usual ; leave them until morning, when untwist and form into ringlets.

To Restore Broken Branches.—Often plants get broken and hang by a thread of bark. Raise the branch gently and place it in perfect contact with the original place ; wind around and cross over a slip of adhesive plaster—cut about one quarter of an inch wide. Press it neatly and closely to keep out the air. The heat of the hand will be sufficient to make it stick.

To Drive Away Black Ants.—Dissolve five cents' worth of tartar emetic in a tablespoonful of water and add a teaspoonful of sugar. Set the mixture in an open, shallow dish where ants are troublesome.

How to Make Nice Candles.—Melt together ten ounces of mutton tallow, quarter of an ounce of camphor, four ounces of beeswax, and two ounces of alum ; then dip or mold them as usual. Candles thus manufactured furnish a most beautiful light, it is said.

To Wash Hair Brushes.—Fill a pan with hot water, with a piece of soda dissolved in it—say a quarter of an ounce to half a gallon of water. Comb the loose hair out of the brushes ; take one brush at a time by the handle,

and dip it in the water without wetting the back of the brush. It must be dipped several times. Then rinse in cold water, and put near the fire or in the open air till dry.

Another good way is to dip them two or three times in a pint of warm water, to which has been added less than a teaspoonful of spirits of ammonia. Rinse immediately in clear water, and dry about the stove. Saleratus water answers a very good purpose likewise.

To Make a Feather Brush.—Select even and pretty feathers, string them with a needle and fine strong twine through the stem at the base of the feathered part above the bare quill; then hammer the quills flat so as to make them lie close to the handle. Wet the handle with strong glue, secure one end of the string and wind the strung feathers around and around the stick until the brush reaches the required size.

As you wind, bind the stems close to the stick with twine, and in finishing the last row, bind them tightly and evenly by winding the twine on the outside over all the quills. Meanwhile keep the quills wet with glue that the brush may be firm when dry.

The twine is then neatly covered by a cap of enameled cloth, or you may use morocco or any fancy leather, with the edge pinked of any required size. Sew the edges firmly and secure it to its place with glue.

The Kitchen Sink.—Have your sink in a convenient place, but never under a window if you can avoid it, as much work is caused by greasy dishwater spattering upon the window, as it necessarily must. Back of your sink nail up a piece of varnished paper, and then you can with a wet cloth remove all spots that would soon spoil room paper.

To Protect Rose Bushes.—To three gallons of soft water add one peck of soot and one quart of unslaked lime; stir it well, let it stand for twenty-four hours, and when the soot rises to the surface, skim it off. Use a syringe for applying it. This wash entirely removes small green vermin so commonly infesting rose bushes.

To Make a Sweeping Cap.—For the pattern of this cap, cut of paper a complete circle, the diameter of which is twenty-one inches. Double this paper by creasing through the center, and trim one inch off the side. This will make the cap when cut, shorter by two inches from side to side, than it is from back to front.

For the material of the cap get five-eighths of a yard of light blue, pink or green Chambray; cut by the pattern, turn the edge under by a narrow hem, and then upon the right side of the goods, one inch and a quarter from the edge, stitch a narrow bias band of Lonsdale cambric entirely around the cap. This is designed to hold the rubber cord which draws the cap into shape and size to fit the head. The edge may be prettily finished by sewing on a narrow cotton trimming or lace, or it can be bound with the cambric instead.

After inserting a rubber cord between the bias band and Chambery and drawing it to the size of the head, the cap is completed by placing a tiny bow of ribbon upon the left side in front, and another with streamers on the back. The bows may be made of the same goods and bound with cambric, if it is preferred.

The cap is worn with the longer diameter from back to front, and when shaped by deft fingers looks not unlike the fashionable "Normandy Cap." Pink bows are pretty on light green caps and light blue upon pink.

How to Peel Peaches Rapidly.—Take a kettle of very strong lye, and heat to boiling; take a wire cage, similar to corn popper—fill it with peaches and dip into the lye for a moment—then into cold water. With a coarse towel wipe each peach, and the rind will peel off smoothly; then drop into fresh cold water, and the operation is complete, leaving no trace of the lye.

Potato Vinegar.—Take quite a quantity of common Irish potatoes, and wash them until they are thoroughly clean; then place them in a large vessel, and boil them until done. Now drain off carefully the water that they have been cooked in, straining it if necessary, in order to remove every particle of the potato.

Put this potato water into a jug or keg, which place near the stove or in some place where it will be kept warm, and add one pound of sugar to about two and one half gallons of the water, some hop yeast, or a small portion of whisky. Prepared in this way, and letting it stand three or four weeks, you will have most excellent vinegar. Water may be saved when boiling potatoes for the table, if the vegetables are scarce.

Blackberry Wine.—Measure your berries and bruise them; to every gallon adding one quart of boiling water. Let the mixture stand twenty-four hours, stirring occasionally; then strain off the liquor into a cask, to every gallon adding two pounds of sugar, cork tight, and let it stand to the following October, and you will have wine ready for use, without further straining or boiling.

To Pickle Meat in One Day.—Get a tub nearly full of rain or river water, and put two pieces of thin wood across it and set the beef on them, distant about an inch from the water. Heap as much salt as will stand on your beef and let it remain twenty-four hours; then take the meat off and boil it, and you will find it as salt as if it had been in pickle for six weeks, the water having drawn the salt completely through the beef.

How to Can Corn.—Take the sweet or evergreen corn before it gets too old, cut it from the cob, fill the cans full, pressed down. Then take a boiler, lay some sticks in the bottom for cans to set on; then lay the covers of the cans on loose, fill the boiler with water so that it will cover half way up the sides of the cans, put the cover on the boiler, boil for three hours briskly, take out and press the covers on tight. Will keep well and have all the flavor of green corn.

Another Way.—Boil the corn fifteen minutes on the cob and then cut it off and dry in the sun. The corn should then be seasoned to the taste with salt, and put into the cans with a very little water. The covers must then be placed on the cans, leaving only a very small aperture for the escape of gas; then place the cans in a kettle of water and boil slowly three quarters of an hour, when the can may be sealed with a drop of solder or even a little putty. Corn preserved in this way will always keep as long as it is necessary to keep it, and there is no danger of bursting the cans.

Fruit Canning.—Porcelain lined vessels are best for cooking the fruit, but many use a bright tin pan or pail, and for sweet fruit brass can be used without detriment. It is a good practice to put a wash boiler, containing a pailful of water, over the fire, and after filling the jars with fruit, scald it by standing them in the boiling water. Seal while boiling hot.

To prepare the fruit for the cans heat a kettle of water to boiling, set over it a bright tin pan containing the fruit, cover it close, and let it thoroughly scald. This requires more time than to set the pan directly upon the stove, but all danger of burning is avoided, and the fruit kept unbroken. At least, it is kept as nearly unbroken as can be expected of ripe fruit after cooking.

Fruit should be nearly or quite ripe. It is not best to risk a great deal for the mere looks of the sauce when set upon the table. Those who wish their canned peaches, pears, quinces, etc., to look "just like fresh," must can them half ripe. Plenty of such specimens are sent out yearly from some of the large establishments—very beautiful to look upon, but not at all wholesome for food.

To Preserve Citron.—Peel the citron, take out the seeds, then cut into quarters and put in a preserving kettle, and add some water, cover tight, and boil until you can thrust a straw easily through them; then skim out carefully, so as not to break them. To one pound of citron use three quarters of a pound of sugar, of the best white, adding lemon as you prefer, removing the seed, or they will render the whole batch bitter.

Add the sugar to the liquor you boil the citron in; boil to a nice sirup; add the citron a little at a time; when done, skim out, keep doing so until all are cooked; add your lemons, cook a few minutes more, and pour over your citron.

To Preserve Quinces.—Peel, quarter and core; boil until tender; skim out, and do not use the liquor they are boiled in, but use it for jelly; also the peels and cores. Make a sirup of the sugar, using pound for pound; add the quinces, a few at a time; boil until done; pour this sirup over the quinces. Make the juice jelly the usual way.

Present Use Pickles.—For cucumbers, the best mode I have ever found is to soak them in a brine made of one quart of salt to one gallon of water, for twenty-four hours, then put them into a brass or copper kettle, cover with alum water, and scald up nearly to a boiling heat, and then take them out and wipe dry.

The amount of alum used should be a lump the size of a hickory nut to four quarts of water. After scalding and wiping pack in a stone crock and heat vinegar enough to cover them and pour on boiling hot.

The pickles are made much better by seasoning the vinegar with spice and sugar. Before heating it up add to each gallon one teacupful of sugar and one half ounce each of allspice and cloves, ground and tied up in a cloth. If spices are put in loose they will stick to the pickles and cause them to be spotted.

I have used in place of the spice, a root of horse radish, which answers a good purpose, and gives a flavor which many relish. If it is desired to have the pickles of a dark green color, put a few leaves from the grape or cucumber vine into the alum water when scalding.

Large sized cucumbers—not ripe—may be made good for immediate use by cutting them lengthwise into four parts, scald them in salt water, then rinse in boiling fresh water, let them drain awhile, then pack in a crock and add the hot spice vinegar made as for others.

Salting Cucumbers for Pickles.—Where a large amount of cucumbers are to be preserved, the best way is to pack in dry salt. Pick from the vines, cutting the stem half an inch or more long, and do not wipe with a cloth, but clean if they require it by rinsing carefully in water.

Pack closely, but not so as to mar the rind; fill all the interstices with salt. Cover with three or four thicknesses of cloth; put on a plank follower with a stone weight upon it. Every time a new lot is added rinse the scum from the cloth, and as much oftener as it collects in any noticeable quantity. A portion may be taken out any time, and after freshening, scald in alum water and proceed as in mode given for present use pickles.

To Pickle Peaches and Pears.—To pickle peaches wipe the fuzz all off with a cloth; put into a crock and put on spiced vinegar hot, but use twice or three times as much sugar as for cucumbers. Pour off the vinegar after a few days, heat and return it; repeat this two or three times, and the fruit will be made excellent.

Some people stick cloves into the peaches before packing them, but I do not think they are very much beautified by the operation, and if spicing is the object any one can use as much as they choose in the vinegar.

Treat pears in the same way, only they should be put through the softening process before packing. Steam them until they can be easily pierced by a straw, and handle carefully. A large spoon will be found better than a fork for transporting them from steamer to crock. A little cinnamon added to the spice bag is a benefit.

Sugar and Salt for Pickles.—Sugar in pickles of any kind is a great benefit; it not only gives a rich taste to the fruit, but it invigorates the vinegar and sustains its life. Salt is of no benefit to any fruit or vegetable to be made into pickles, save those like the cucumber or watermelon, composed of

ninety per cent. water. The salt draws out the water and puts them in proper condition for the vinegar.

If the water is not extracted by this means, the vinegar will absorb it, and become greatly diluted, and the pickles will not be first quality. For this reason cucumbers for long keeping should be put down in dry salt; plenty of brine will be made by the juice of the vegetable.

How to Carve.—Although it is a daily duty for many men and women to cut up meat for a family, there are multitudes who do it neither wise nor well. The following suggestions from a caterer on this point will be an aid, especially to young housekeepers.

To carve fowls, which should always be laid with the breast uppermost, place the fork in the breast and take off the wings and legs without turning the fowl; then cut the merry-thought; cut slices from the breast; cut out the collar bone; cut off the side pieces, and then cut the carcass in two. Divide the joints in the legs of a turkey.

In carving sirloin, cut thin slices from the side next to you (it must be on the dish with the tenderloin underneath), then turn it. Help the guests to both kinds.

In carving a leg of mutton or ham, begin by cutting across the middle to the bone.

Cut a tongue across and not lengthwise, and help from the middle part.

Carve a forequarter of lamb by separating the shoulder from the ribs and then divide the ribs.

To carve a loin of veal, begin at the smaller end and separate the ribs. Help each one to a piece of kidney and its fat. Carve pork and mutton in the same way.

To carve a fillet of veal, begin at the top and help to the stuffing with each slice. In a breast of veal, separate the breast and brisket, and then cut up, asking which part is preferred.

In carving a pig, it is customary to divide it and take off the head before it comes to the table, as to many persons the head is revolting. Cut off the limbs and divide the ribs.

In carving venison, make a deep incision down the bone to let out the juice, and turn the broad end toward you, cutting deep and in thin slices. Warm plates are very necessary with venison and mutton, and in winter are very desirable for all meats.

GIRLS AT HOME.

There is a certain class of ornamental or fancy work that seems to belong especially to the girls. Their tastes and deft fingers appear to be particularly fitted to the performance of the same. The almost entire disappearance of that old, senseless prejudice of fathers against their daughters wasting their time in what was considered useless and foolish employment, gives the girls of the present day, rural or city, free scope to the employment and enjoyment of innate gifts. The privilege is one that should be improved by all. No one will regret the work who attempts it.

As in most other occupations, the production of ornamental work, be it simple or complicated and difficult, involves certain mechanical principles that educate for other and sterner departments of domestic industrial affairs. Besides this, it cultivates a taste for the beautiful, that will have an outcropping in home adornments and multiply comforts when they become the mistresses of their own habitations.

Show me the housewife to-day who has all about her tidy and tasteful, and I will show you a lady who had her girlish tastes in an artistic way encouraged and strengthened while under the parental roof.

It does not require wealth to develop an exquisite and refined taste in any person. Symmetry and true genius will be made to stand out as boldly in the arrangement of a rustic mug filled with forest flowers and wild grasses, as with the most elaborately wrought vase that can be found decked with the rarest of blooming beauties.

The fields and the woodland wilds are laden with growths that may be collected and converted into ornamental articles; bits of fabric, too, may be metamorphosed into useful and pretty commodities, and as the taste develops with experience, new sources are discovered which furnish abundance for amusement in an artistic way.

In the following pages of this work it has been the author's effort to describe the making of only such articles as may be produced by any girl who may desire to undertake it. No effort has been put forth to reach the higher arts—only the preliminary steps that may guide to perfection.

Upon the leading subject, that of wax flower making, the directions have been obtained from Mrs. E. S. L. Thompson, a professional worker and teacher in the pleasant art of imitating nature's beauties. Her mode of making will be found simple, clearly explained, and entirely practical.

WAX FLOWER MAKING.

Molds for Wax Leaves.—Have ready a number of leaves such as oak, ivy, rose, geranium, fuchsia, heliotrope, etc. Place them on a large sheet of writing paper, with the smooth side of the leaf lying on the paper.

With a common mucilage brush and some melted lard, brush carefully over the back part of the leaf. Then mix in a deep dish or bowl one half pound of plaster Paris, using water enough to make a stiff batter. Dip out quickly (as it hardens easily), and cover each leaf in turn with a thick coating of the Paris.

Smooth over with a case knife, then in a half hour turn over the molds and with a penknife carefully remove the leaves. Then allow molds to stand until perfectly hard, and they are ready for use.

To Sheet Wax for Wax Flowers.—Melt by a slow heat one pound of best cake wax in an earthen dish. When thoroughly broken up in small pieces, add one large tablespoonful of balsam of fir, stirring in with a clean stick. If a pure white is wanted, add a tablespoonful of silver white (tube paint), stirring in thoroughly.

When all is well mixed, strain through a thin white muslin cloth into a clean earthen dish. Have ready a pane of glass, a basin of water, and a dipper with a long handle. A small table with a covering of thick brown paper is best to work on.

Have your wax on the stove hearth, keeping it warm, but not hot. Dip your pane of glass in the basin of water, shake off all the drops quickly; then dip up a dipper of wax and pour down lengthwise of the pane. Slip the point of a knife under one edge and remove carefully. Wet the glass again, shake off the drops and make another sheet, and so on until you have a sufficient quantity.

If you wish colored wax, tie a half teaspoonful of dry paint, any color you may desire, up in a small thin cloth. Press it out into your melted cake wax, to which the balsam of fir has previously been added. By using care a very desirable result may be obtained.

In using the wax which you sheet yourself, if not in warm weather, be sure to have the room in which you work quite warm, as the wax breaks easily.

Lily of the Valley.—Materials required are lily of the valley leaf mold; one package white wax (single); one package dark green wax (single); one spool green wire (silk wound). The cost of these materials will be ninety-five cents, and they will be sufficient to make a fine spray for three bouquets. A piece of the spool wire three inches long for the stalk; wind this with a narrow strip of the dark green wax. Then cut eight pieces of the spool wire one and one-fourth inches long for the stems.

These should be wound with a narrow strip of the white wax and a ball the size of a pin head made with the wax on the top of each of the eight small

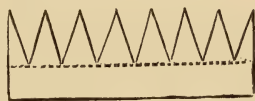
wires. One cent's worth of the very lightest shade of dry paint (yellow) is useful in making the lily of the valley. A very small quantity rubbed on the white stems and the ball at each end; then cut with a steel pin eight pieces the size and shape of figure below.

Place one of these around the long stem which forms the stalk, having first made a ball the size of a pin head on the end of the stalk. This little ball should be right in the center of the flower and is intended to represent the pollen.

With your steel pin turn the pointed edges of the flower slightly back, as that is the natural appearance of the lily of the valley. Place a flower on each of the small wires, pressing down around the stems and fastening the edges together with the warmth of the fingers.

Attach the small wires to the stem by winding them carefully around just enough to fasten them, curving the stem enough to make the flower hang down a little. Two leaves are required for each stem of the lilies.

Have ready two pieces of green spool wire (or stem wire is better) three inches and a half long. Dip your brass leaf mold into water, shake off the



LILY OF THE VALLEY PATTERN.

drops and lay a sheet of the dark green wax smoothly down on the leaf mold, press it down firmly, and then lay in the stem which has previously been wound with a narrow strip of the dark green wax.

The stem should only extend about half way up the length of the leaf. Then place another sheet of the dark green wax over the mold, press down firmly so that the veins may show, and the wax may be cut off neatly around the edges.

After making two leaves in this manner, place the stem of lilies upright between the leaves, twisting the stems together immediately at the bottom. Your "lily of the valley spray" is now complete and ready for the vase.

The Pond Lilies.—Materials required are one pond lily leaf mold, one package green stems for leaves, one package light green pond lily wax, one package white pond lily wax, one package light and one of dark yellow wax, one bottle Indian red, dry paint, one large, glass headed molding pin, one coil white bonnet wire.

The usual cost of these materials will be one dollar and a half. They may be had at any reliable art store; the bonnet wire at any millinery shop.

To Make the Pollen.—Fold or double a sheet of light yellow wax lengthwise of the sheet. Then with a pair of sharp scissors notch it across as

in fig. 1, one inch wide and three inches long. Pinch the end of each notch between the thumb and forefinger, then the notched strip is ready to place on the stem. Fold a dark yellow sheet in the same manner and cut with a little larger points.

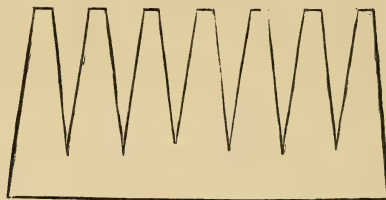


FIG. 1.—POND LILY POLLEN PATTERN.

To Make the Stems.—For each stem take a piece of wire a third of a yard long. Having cut some narrow strips of green wax, wind the stem carefully, pressing the wax down with the warmth of your fingers. Make a small hook at the upper end of the wire to prevent the leaves from slipping upward



FIG. 2.—POND LILY PETAL PATTERN.

in putting them together. Cover this hook with a small ball of yellow wax; with the point of your glass pin make a dent in the center of the ball, and draw lines from the center to the outer edge of the ball to give the appearance of a star; then roll the light yellow strip around the stem, pressing it neatly and firmly down. Then put on the dark yellow strip, whose points must be rubbed lightly with the finger dipped in a small quantity of the Indian red paint.



FIG. 3.—POND LILY PETAL PATTERN.

To Make the Leaves.—Cut with the sharp point of your glass molding pin eight pieces the size and shape of fig. 2, being careful to have your sheet of wax laid on some clean white paper on a smooth table, and dipping the pin

in water occasionally to keep it from sticking and tearing the wax. Lay your pattern lengthwise of the sheet of wax; it will not do to cut the leaves out cross-wise of the sheet.

Then dip the knob of the pin in water, shake off the drops, and roll the rounded end of the leaf until it is cupped half way down its length and especially at the end. When the eight leaves are well rolled, begin placing them on the stem. Place the bottom part of the leaf right on the stem, letting the edge of the leaf rest on the bottom edge of the center of yellow wax.

Place another leaf immediately opposite the first, pressing on firmly with the warmth of your fingers, and so on till you have eight small leaves. Make eight more leaves from pattern like fig. 3, and having rolled them, place on in the same manner, allowing the rounded edges of the size fig. 3 to project a little above the edges of fig. 2.



FIG. 4.—POND LILY PETAL PATTERN.

Of fig. 4 make eight leaves, roll and place on a little above the edges of fig. 3. Of fig. 5 make sixteen leaves and place on a little above the edges of fig. 4. Make eight more leaves shape of fig. 5, only more rounded at the top; roll and place on a little above the edges of fig. 5.

Cut eight leaves out of the green wax slightly larger—a little longer and wider than fig. 4—roll and place on in the same manner as the white ones, immediately



FIG. 5.—POND LILY PETAL PATTERN.

over those last placed. These are for the calyx; then rub them on the outside with a little Indian red paint. This is also used on the leaves.

For leaves take two pieces of green stem wire for each leaf, and wind them with narrow strips of green wax. Four leaves with a lily and a bud is sufficient. When your stems are all wound, take your brass leaf mold, dip it in water, shake off the drops, then lay on it a sheet of green wax, press it down lightly, so that it will adhere to the mold. Then place in your stem a little over half way down the length of the leaf.

Fold over your sheet of wax, press down firmly until the veins are plain and the edges cut neatly off all around, and so on until your four leaves are complete. Then rub over the veins with a very small quantity of the Indian red paint, as the leaves and calyx of the natural pond lily are slightly tinged with a reddish brown color.

After you have completed your lily, coil the wire up about three times, bending the lily stem until it rests immediately in the center of the coil; attach the leaves to the coil as neatly as possible, or what is better, fasten immediately to the stem of the lily. This must be done with great care, as the wax is easily broken. For the bud, make in the same manner as the lily, using only half the number of leaves.

The Calla Lily.—Materials required are one wooden molding pin; one-fourth package magnolia wax (this wax comes in large sheets and is cream colored); one yard bonnet wire; one-half package green pond lily wax; a small quantity of dry paint (chrome green), and a small quantity of corn meal.

To get the leaf mold for the calla lily you must make it yourself of plaster of Paris, according to directions given before for molding leaves. Now cut from your cream colored sheet wax two pieces the shape of fig. 1, five and a half inches long and three and a half inches wide. One is for the full blown lily and

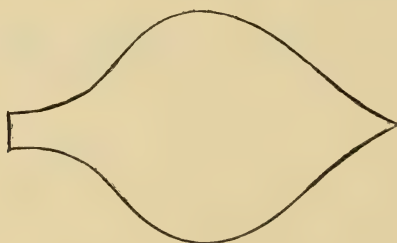


FIG. 1.—CALLA LILY FLOWER PATTERN.

one for the open bud; having previously wound a piece of the bonnet wire with a narrow strip of green wax. The wire for the stem should be nine inches long.

Now take a strip of the cream colored wax three and a half inches wide; beginning at top of the stem, fold it around the stem lengthwise and press neatly and firmly to place. Now roll this calyx in a small quantity of light yellow

wax, afterward roll it in corn meal. Now mold the two pieces cut like fig. 1 with your wooden molding pin.

The only way to do this successfully is to have a calla lily in bloom for a guide, or else a picture of one, such as is seen in chromos. After rolling or molding to shape, place on the stem, letting the bottom of the stem rest on the bottom edge of the piece used for calyx. Rub the lower edge of the calyx with a very small quantity of green paint.

Make the half open bud in exactly the same manner, only roll to give a less open appearance. The calla lily flower grows up between two leaves and should be sprayed to have that appearance. The leaves are molded on the plaster of Paris leaf mold, which you should make from the natural leaf before beginning the flower. Use for the leaves light green pond lily wax.

The Orange Blossom.—Materials, one-half package white sheet wax, single, one-half package light green wax, single, four or five stems orange blossoms leaf mold, glass headed molding pin, and a small quantity of light yellow wax.

First wind three pieces stem wire with narrow strips of the light green wax; now wind three more stems about two-thirds as long as the first three; the half length stems are for the leaves, which are molded in the same manner as directed for other leaves.

On each end of the full length stems make a small hook and cover it with a ball of the green wax; now cut a strip of white wax, doubled an inch long and a quarter of an inch wide; with a pair of sharp scissors cut half way through the depth of this piece, and clear across, so as to give it the appearance of fringe.

Wet the edge lightly, and dip in the dry, yellow paint. Now roll the bottom edge of this piece around the lower edge of the first green ball made on the stem; when that is done, turn the serrated points out a little with the sharp point of your molding pin. Now cut from the white wax twelve pieces the size and shape of fig. 2; roll with the glass head of your molding pin, so that the



FIG. 2.—ORANGE BLOSSOM PATTERN.

rounding edge will turn slightly out from the center. The twelve pieces will make three flowers. Place on the stem with the lower straight edge of fig. 2 resting on the lower edge of first small green ball. Place on one piece, then one exactly opposite until you have four. Arrange the stems by twisting together carefully after you have completed the flowers and leaves.

Observe the natural tree (grown by a great many outside of green houses)

for the arrangement of the leaves. To give the leaves the glossy appearance natural to them, rub with the forefinger, or with a stomp brush.

White August Lily.—Materials, one bunch lily stamens, one-half package double white wax, one package light green wax for leaves, a few green stems, one large glass headed molding pin (the same as used in making pond lilies), five cents' worth of dry paint, light yellow. The leaf mold must be made from the natural leaf, according to the directions in "molds for leaves."



FIG. 1.—WHITE AUGUST LILY PATTERN.

This lily blooms in August, but the leaf mold may be made the last of June, as the leaves are well developed by that time.

Now cut two pieces like fig. 1, three inches wide at top and six inches long, from your double white wax; roll so that the points will turn outward a little and the center part of the lily be cup-shaped. Having two stems wound together, or what is better, a piece of bonnet wire nine inches long, with a narrow strip of green wax; take a strip of white wax two and a half inches long and half an inch wide, double it lengthwise and roll around the stem, placing in five lily stamens, the center one projecting half an inch beyond the rest.

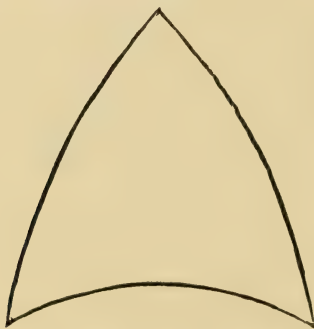


FIG. 2.—WHITE AUGUST LILY CALYX PATTERN.

These stamens should first be wrapped up to the ball part with strips of white wax, sufficiently wide to cover them neatly, and the ball part dipped in the dry, yellow paint. Now place the two parts of the lily on the stem, joining carefully by pressing the edges together with the warmth of the fingers. The points of the lily must project a fourth of an inch beyond the lily stamens.

To make the bud cut pieces the shape of fig. 1, only smaller. The lily and bud grow up out of a green calyx shaped like fig. 2.

Cut the pieces of green sheet wax and place on the stem with the pointed part turned toward the top of the lily and a little open. The bottom part of this green calyx should rest immediately on the bottom of the lily stem, or to be plainer, on the bottom of fig. 1. Observe the natural lily for perfect arrangement.

Mold the leaves very carefully, using the green stem wire, first wound with strips of wax, and thoroughly saturating the leaf mold with water before placing on your sheet of wax to mold leaf. This must be done quickly on all plaster of Paris molds, as they dry off so easily, not giving perfect veining unless very moist.

The Pink Day Lily.—Materials, one half-package rose pink wax, four pieces green stem wire, one-half package light green wax, double, seven lily stamens; one bunch will make a spray of the white August and pink day lily.



FIG. 1.—PINK DAY LILY PATTERN.

For the full blown lily cut two pieces the shape of fig. 1, two and one-fourth inches wide and four inches long, being careful to lay your pattern lengthwise of the sheet of wax.

Roll with glass headed molding pin, exactly as you did for the August lily. Use a piece of bonnet wire six and a half inches long for lily and bud stem. Use the stem wire for the leaves. Wind the piece six and a half inches long with a narrow strip of green wax; then take narrow strips of pink wax and wind the stamens up to the ball part; dip the ball part of stamens in light yellow paint. Then take a strip of pink wax half an inch wide and two inches long



FIG. 2.—PINK DAY LILY LEAF PATTERN.

and fold lengthwise around the stem, placing in the stamens; six of them exactly even one with another and the seventh or middle one half an inch longer than the rest. Now arrange lily on the stem exactly as you did white August lily and finish with a green calyx.

The leaves of this lily may be made without leaf mold ; they are perfectly straight on the edges and have fine veins. Make your pattern of Bristol board, cutting of green wax two pieces like fig. 2, three-fourths of an inch wide and five inches long, for each leaf. Having first wound three or four pieces of stem wire, cut out your leaves, laying in the stems exactly as you would if using leaf mold. Make the veins by drawing the point of your molding pin very carefully through the center of each leaf three or four times after they are stemmed.

The Rose and Bud.—Materials, one package white, light pink, deep crimson or pale buff wax. (If variety is desired, a rose and bud of each of these colors may be used in bouquet). One package green stem wire, one package dark green wax and one package light green wax.

Use large glass headed molding pin for molding leaves into shape ; rose leaf mold, large or medium size, according to the color of rose you are making. Make a small hook at the end of one stem wire ; then with a narrow strip of green sheet wax wind the stem very neatly.

Cover the hook with a small piece of wax, which has been doubled three or four times, so as to form a small ball. This ball should be the same color as the rose you intend making. Below the first ball make one slightly smaller, which is covered with green wax for the calyx after the rose is complete. Now cut ten leaves the size and shape of this pattern.



ROSE LEAF PETAL PATTERN.

With the head of the glass pin roll them cup shaped, being careful to dip the pin in water occasionally, to keep it from adhering to the wax. Now begin placing them on the stem ; roll the straight part of the first leaf around the bottom part of the ball made on the hook.

The wax is very pliable, and no difficulty will be experienced in giving the leaves the natural shape and position of a rose leaf. Continue until you have placed five on the stem, letting the sides of each leaf lap the one over the other, this gives the rose a rich double appearance.

The five remaining leaves may now be placed on the stem ; the curved or scalloped part of each leaf a very little below the first row of leaves. Now cut ten leaves a size larger than pattern ; roll them in the same manner as the first ten, and place five of them on the stem a little below the last leaves molded on.

Vary the arrangement of the remaining five by placing the hollow outside, in-

stead of in, as you have done throughout the rose. Now cut ten more still a size larger, roll them cup shaped and place on the stem a very little lower than the last ones molded on, giving them a curve here and there as near like the natural rose as possible. Thirty leaves of the sizes given make a large full-blown rose.

If a small, delicate rose is desired, cut the leaves the same shape but smaller. A natural or artificial rose is good for a model. Now cover the calyx with a narrow double strip of the green wax.

To make a **half blown** bud use half the number of leaves. Use the green sheet wax, light or dark, according to the color of the rose, for the stem leaves; molding them on your leaf mold in the same manner as described for the pond lily leaf.

All leaves are molded by the same process, using of course different molds for different flowers. Three stem leaves, a full-blown rose and a half-blown bud are used in one spray with fine effect.

The Fuchsia.—Materials, one-fourth package stem wire, one-half package each white, pink and light green wax, fuchsia leaf mold, one bunch fuchsia stamens. Fuchsias are of different colors, pure white ones are used on wax crosses; then we have in the natural flower those with very double purple centers and deep crimson petals, others with pink petals and pure white centers.



FIG. 1.—THE FUCHSIA PATTERN.

To make a spray of those having pink petals and white centers cut eight pieces from the white wax the size and shape of fig. 1. Roll them cup shape exactly as you did for the rose. Make a hook at the end of the stem, the same as for the rose; then take a piece of wax not quite one inch long and less than half an inch wide and roll around the hooked part of the stem, which must be wound with a strip of wax; first having placed five stamens, two on each side and one immediately in the center of long narrow piece before rolling it around.

Let the center stamen come out a third longer than the other four, observe the natural fuchsia for correct arrangement. Now place on the cup shaped pieces,



NO. 2.—FUCHSIA BUD PATTERN.

the first and one immediately opposite, until you have used four, the remaining four are placed on in the same manner, only a little lower on the stem,

For a double fuchsia use eight pieces, for a single one but four. Now cut from the pink wax four pieces like fig. 2; roll so that the pointed part will bend slightly backward. Place on the stem with the straight part of fig. 2, resting immediately where you placed the pointed part of fig. 1. Finish your fuchsia with a small strip of green wax for the calyx.

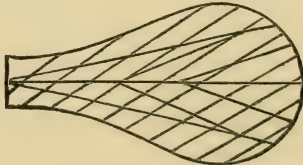
To make a half open bud, roll the pieces like fig. 2, as you did for the full-blown fuchsia, but turn the pieces over and bring the points together just so they will touch. Mold the leaves on your fuchsia leaf mold exactly as has been described for other leaves. In making any flower, the best guide any one can have is a spray composed of full-blown flower, half-open bud and leaves.

To Make the Abutilon.—The materials required are, half package light green, half package white, half package yellow (light) wax; some green spool wire, abutilon leaf mold, glass headed molding pin, small camel's hair brush, one tube dark yellow oil paint, and one bunch rose stamens. These materials will cost about one dollar, and will make enough for four bouquets, or be sufficient to teach three or four persons.

First mold your leaves in this manner: Take a piece of wire three inches long, and wind it with a narrow strip of the green wax; now wind two other pieces of wire, each one and one-half inches long. Dip the leaf mold in water, then shake off the drops, lay a sheet of wax lengthwise on the back of the leaf mold; press it down around the edges, when it will cut off. Now lay the longest wire which you have already wound exactly in the center of this leaf, and lay over it another piece of wax lengthwise of the sheet.

Press this firmly down so as to get a good impression of the veins, and your leaf is ready to remove from the leaf mold. Dip your finger in water and rub around the edges, when it will easily come off. Mold two more leaves in exactly the same manner (on the shorter pieces of wire) and join them to the first leaf. A spray of the abutilon is best to have by you for a model.

Now for the flower. Cut of white wax six pieces the size and shape of illustration. Roll until cupped around the rounding edges. Then, with your camel's



THE ABUTILON PATTERN.

hair brush barely dipped in the dark yellow paint, draw fine veins all over the six pieces. These veins are represented by the lines in the figure.

Lay them aside and cut off a piece, two and a half inches long, of the spool wire. Make a hook at one end and cover it with a narrow strip of wax one-half inch long and a fourth wide. In this place five rose stamens, the one in the

middle longer than the rest, folding the wax around firmly to keep the stamens in place. After this is done, wrap the stem with a narrow strip of light green wax. Now place the six pieces prepared on the stem, allowing the bottom, which has a narrow straight edge, to rest right around the full part covered with the narrow strip of wax.

The abutilon is full shaped, and when the pieces are all on, its appearance is rich and double. Finish off when the pieces are put on with a small piece of wax, and join your flower to the leaves. To make yellow ones, proceed in the same manner, veining them with the dark yellow paint.

Moss for Moss Rose Buds in Wax.—Go to the woods and find some old log on which has grown moss with a fern like appearance. Remove it carefully and place in the basket that you have brought along to hold your "forest treasures." When you reach home place it in a pan of water, carefully removing all the dirt. Then with small scissors detach the pieces (an inch long if you can get them that way) and place in an old book.

Smooth the moss out, and do not place more than four pieces in one place, leaving three or four leaves between each time you put in moss. When done, lay your book away with a heavy weight on it. In five or six days you can remove the moss and place in a small box among your wax materials. I have prepared moss this way, and found it very nice. If you buy it you will find it expensive.



FIG. 1.—PERIWINKLE PATTERN.

The Periwinkle.—Materials: Steel cutting pin, one bottle crimson paint (dry), one package white wax, one spool green cotton wound wire, one bottle green paint (dark). These materials will make a cluster of periwinkles, a cluster of white and a cluster of crimson verbenas, leaving enough for a handsome sprav of ivy and tea roses.

Have ready a cup of water and a clean sheet of writing paper. Cut out of stiff paper or very thin pasteboard a pattern like fig. 1. Then lay a sheet of

wax down smooth on the writing paper. Wet the point of the pin in water, and carefully cut out exactly by the pattern.

Three the size and shape of fig. 1 will be enough. Then wet the ball part of the pin in the water, shake off the drops; then place your "periwinkle" in the left hand and roll the curved edges cup shaped with the ball part of the pin. This can be easily done.

Each one of the three should be prepared in this manner and laid aside until the stems are ready. Cut from the spool of wire one stem two and one-half inches long, make a hook by bending the wire over at one end; on this hook a small piece of wax should be placed (about as large as two pin heads); this can be done with the very small scraps of white wax. Color this small ball with the crimson paint rubbed on with a small Canton flannel cloth.

Cut two more pieces of wire one and one-half inches long, and prepared in exactly the same manner. Then you place the "periwinkles" on their stems; this is done by carefully punching the stem wire through the center of the flower (just enough to bring the ball through on the right side), pressing the flowers up neatly and carefully around the stem.

Now twist the ends together, leaving the longest or center stem to project half an inch above the others. You can now make the leaves.

Cut of thin pasteboard or cardboard a pattern like fig. 2. Then out of

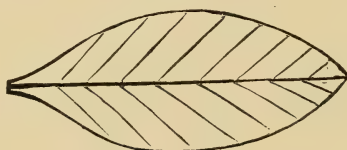


FIG. 2.—PERIWINKLE LEAF PATTERN.

scraps of white wax, cut by the pattern six pieces like fig. 2, coloring them green. These, when stemmed, will make three leaves.

For the stems, cut of the wire three pieces one and a half inches long. Take two leaves and lay together with the wire laid in between nearly the whole length of the leaf; press together firmly, then lay down on the table, and with the pin (first dipped in water) make small veins, as represented by fig. 2. The three leaves are stemmed together with the cluster of flowers, the leaves projecting above the flowers.

The Butterfly Geranium.—Materials: One half package white, one half package rose pink wax, two yards green spool wire, one bottle deep purple dry paint, one bottle magenta dry paint, glass headed cutting pin, one-half package green single wax, of a light shade, and a plaster of Paris leaf mold.

To Make the Leaf Mold.—Before giving directions for the flower, I will give directions for the leaf mold. You can make a dozen different kinds of leaves at the same time. Have ready a good sized pine board on a table.

The board must be perfectly smooth. Now have your geranium leaf and other leaves in a pan of cold water, also have some very small pins, a tack hammer, and ten cents' worth of plaster of Paris, a bowl and a knife near at hand. Five cents' worth of gum shellac dissolved in a small quantity of alcohol and a small brush (camel's hair) will be necessary to varnish the molds after they are made. The cost of all material for two dozen molds is not over twenty cents, and they are just as good as the brass ones, which cost twenty cents each

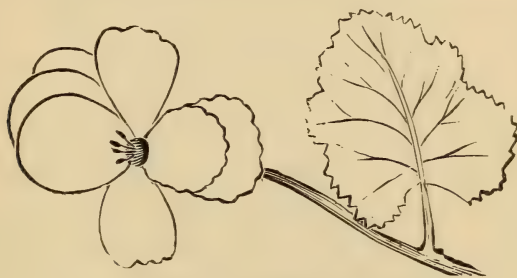


FIG. 1.—BUTTERFLY GERANIUM, HALF NATURAL SIZE.

When you are ready wash off your board thoroughly, so as to have it very damp; then carefully tack each leaf down with its right side up. The pins must be *very small* and pounded down even.

Mix up the Paris with cold water to the consistency of a thick, smooth batter; do not mix more than half of it at a time, as it hardens rapidly. Dip with a large spoon and pour over the leaves, cover them completely, putting on the batter until it is half an inch thick. Now smooth over with a wet case knife.

When all the leaves are covered, allow them to stand until you can turn the molds over without breaking. Any pieces of leaves adhering to the molds can be removed carefully with a penknife. In half an hour varnish the inside of all the leaf molds with your small brush dipped in the gum shellac. When the varnish is dry the leaf molds are ready for use.

Molding the Wax.—Take your butterfly geranium leaf mold, dip it in water, shake off drops, then lay on a piece of the light green wax, press it down gently and place a piece of wire two inches long in the center. Lay on another piece of wax and press firmly down. Now slip your leaf from the mold, and trim the edges, if a little rough, with a small pair of sharp scissors. All leaves are molded in the same way. Three leaves are enough for one spray of butterfly geranium. Group them together as near like the natural flower as possible.

We are now ready for the flower. There are a number of varieties; white with purple spots, pink with purple spots, and light canary color with pink spots are the most beautiful.

To Make the Flower.—Figure 1 represents the flower and leaf half size. The illustration is taken from a very fine specimen in the writer's study,

Cut of the pink wax three pieces shape of fig. 2, one and one-eighth of an inch wide and one and a fourth long. Take out a small quantity of the magenta paint, mix it with a little of the purple and rub on the place designated by A, then with your glass headed pin roll these pieces until they are a little cupped.



FIG. 2.—BUTTERFLY GERANIUM LEAF SECTION.

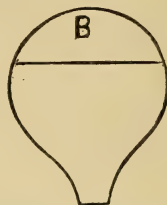


FIG. 3.—BUTTERFLY GERANIUM LEAF SECTION.

It is not necessary to wet the head of the pin when anything has been rubbed with dry paint. Lay these aside and cut three pieces shape of fig. 3, same size as fig. 2, and one piece two sizes smaller. Make some pointed edges, as indicated by the straight line drawn across the top of the figure below B. Color these around the edges with some of the paint you have already mixed.

Now roll them a very little around the edges. Cut a stem three inches long, double it over to form a small hook at one end; cover this hook with a small piece of light green wax, rolled round like a ball, and wind the stem with a narrow strip of green wax. You are now ready to put your flower together.

The pieces like fig. 2 are put on first. They are arranged as indicated in fig. 1. The pieces like fig. 3 are next put on. When the pieces are all on, finish off with a small bit of green wax for calyx. Join the flower to the leaves already molded. The white ones are cut by the same patterns, and spotted with dry purple paint.

The Pansy.—Materials: one pansy leaf mold, one bottle dark purple (dry) paint, one large headed cutting pin, one small headed cutting pin, half package double white wax, half package green (a bright color, but not light), one bottle light yellow paint, half dozen pieces green stem wire, a little lamp black. I carefully save all small scraps of wax when making wax flowers, laying them between the leaves of an old book. These scraps do for small flowers, stem winding and calyxes. Cut out of white wax one piece the size and shape of fig. 1. With a small Canton flannel cloth color the under side purple. It is necessary to rub the paint on lightly, as the under side does not show. When using the dry paint pour a small quantity of each color you wish to use into a small saucer; it is then convenient, and will not soil wax you do not want colored.

Color the upper side of the piece like fig. 1, with light yellow (a small spot) near where it is joined on the stem. You will see what is meant by looking at

fig. 4, where the whole flower is represented. Then with purple paint color a larger spot purple, around it a band of light yellow, and the remainder of the piece purple.



FIG. 4.—THE PANSY IN WAX.

Veining the Pansy.—The veining is done with the point of a lead pencil dipped in mucilage, then in lamp black, and carefully drawn over in lines as indicated in fig. 4. This veining must be done lightly, else it will cut the wax. Now cut of the white wax two pieces the shape of fig. 2. Color them light yellow around the edges of the upper side as indicated by the narrow line.



FIG. 1.—PANSY FLOWER SECTION PATTERN.



FIG. 2.—PANSY FLOWER SECTION PATTERN.

In fig. 4, where the whole flower is represented, you will see how to color, the dark spots representing the purple, and the light the yellow. Now cut two more pieces the size and shape of fig. 2, only a little broader and longer, coloring them as indicated in the engraving, fig. 4. All of these pieces should

be rolled with the glass head of the cutting pin before they are veined with the lampblack or placed on the stem. Cup the edges a very little.

Never wet the head of the molding pin for flowers, colored with dry paint, as the paint prevents the pin from sticking to the wax.

To Make the Stems.—For the stem take a piece of wire three inches long, make a small hook at one end and cover it with a ball (very small) of green wax, first having wound your stem with a narrow strip of green wax.



FIG. 3.—PANSY CALYX PATTERN.

Now place the piece numbered as fig. 1 on the stem. By looking at full flower illustration you cannot fail to see the exact arrangement of the pansy. When the pieces are all neatly placed on the stem add a calyx of green wax cut like fig. 3. The leaves are molded on the leaf exactly as all leaves before described. Two or three leaves and little buds formed of wax will be sufficient.

Tint some of the leaves with a little of the carmine paint, rubbed on with your finger. Take some of the white wax and mold small balls, flattening them out like fig. 2; color them with the carmine paint, and place on the stem just where the leaf branches out.

To Clean Soiled Wax.—Moisten a cloth in turpentine and rub very carefully.

For Tea Roses.—Use two shades of wax, very light straw color for the center, and very light pink for the outside row of petals.

For Pansies.—Mix dry paint, carmine and blue, more blue than carmine, and rub it into the white sheet wax, having the wax quite warm and pliable, so that it will take the color well.

For Coral Honeysuckles.—Rub vermilion (dry paint) into the white sheet wax.

Pigments for Wax Fruit.—Generally speaking, the color of the wax employed is that of the lightest parts of the fruit, the deeper tints being afterward laid on with brush or pencil.

The chief pigments employed are such as burnt and raw umber and sienna, chrome yellow, red lead, Prussia blue, carmine, lake, etc., greens being produced by various admixtures of blue and yellow.

Waxing Glass Balls.—Certain small varieties of fruit, such as grapes and currants, are made of glass bulbs, carefully blown to the proper shape; these are fixed by wax to wire inserted into holes, and are then dipped into melted wax of the proper color, a very thin coating of which gives the proper kind of semi-transparency to the glass, and at the same time a smoothness of surface not inaptly resembling that of the natural fruit.

Wax Vines for Picture Cords.—The bareness of picture cords is very much relieved by trimming them with vines made of wax. The ivy is very pretty, and is easily made. I use the dark green wax, making what is called the Irish ivy.



WAX VINE FOR PICTURE CORD.

One spool of fine green silk wound wire, two packages dark green wax, two ivy leaf molds (one small, one medium size), one cutting pin, one bottle paint (deep carmine), one package white wax.

Fig. 1 represents a branch of the Irish ivy, half natural size. Cut your first wire several inches longer than the picture cord on one side. Then cut shorter pieces to use for the stems of the leaves.

Dip the large sized leaf mold in water; shake off the drops, and then lay on it a piece of the dark green wax, enough to cover it just over the edges. Press that down firmly, and then lay in the stem right in the center, after which lay on another piece of green wax, pressing it firmly around the edges, when it will cut off just the shape of the mold.

Moisten the edges of the mold and remove the leaf. Make about twenty-five of the medium-sized and twenty-five of the small size, then spray or arrange them as near like an ivy spray as possible. It is better to have a piece of ivy to look at while you are working. You will be surprised how much difference these vines make in the artistic effect of a parlor.

To Make White Crosses.—If the cross frame is not painted white, cover it with thick writing paper; paste the paper on with starch which has been well boiled and strained. Use white spool wire (silk wound) for the stems of your small fine flowers, and spool wire (cotton wound) for the larger flowers.

For pansies, pinks, tuberose and honeysuckles, it is best to have the tin flower cutters. They may be had of any first class art dealer. They vary in price according to the number of pieces in the flower; general price, twenty cents.

Wax Fruit Making.—Some specimens of wax fruit are marvelous for their faithful imitation of the real. In making these, molding or casting is of more importance than in flower making, seeing that accuracy of form is the chief thing desired. The following very excellent hints are given upon this subject by a correspondent :

Molds for Fruit.—The greater portion of wax fruits are made by the use of double molds, one for each half, and, if the fruit is irregular in its curvatures, a tripartite mold may be needed.

If an orange is to be imitated in wax, a smooth, damp surface of sand is prepared, into which exactly one-half of a good orange is carefully pressed; a cordon or border of tin or stiff paper is built up around it at about half an inch distance from the orange on all sides; plaster of Paris, in a creamlike consistency, is poured into the cell thus made so as to fully cover the orange; when quite firm enough to handle, this plaster half mold is taken up, and the orange extricated; the orange is turned over in the sand and another half mold made in a similar way.

Whether fruit is cast solid or hollow depends mainly on the size; if large, the mass would be heavy, and much wax wasted by solid casting; in this case a core of some rough material is fixed in the middle of the mold, which gives a cavity to the middle of the fruit.

Soft kinds of fruit, such as plums, cherries and ripe pears, and some hard and unyielding fruits, require special management to extricate them from the half mold without injury to the fruit on the one hand, or to the mold on the other. Pomegranates, pineapples, etc., require molds in more than two parts. Occasionally, elastic molds of glue are found advantageous.

Wax Fruit Fastenings.—The fastening of the various fruits to imitative stems, leaves, leaflets, etc., is an affair of wires, silken thread, strips of green paper, white flock, arrowroot paste, gum mastic, varnish, with other simple materials and tools employed in artificial flower making.

NATURAL FLOWERS AND PLANTS.

Cut Flowers.—Not every lover of flowers has learned that sand is better than clear water for the preservation of house bouquets. White sand, not too coarse, is best. With it fill the dishes nearly three quarters full, and make it very wet to receive the flower stems.

Flowers keep fresh longest if cut when the dew is on them, and fade soonest if cut when in a warm sun. The water that stands on the top of the sand should be renewed every day; a pinch of salt will do no harm and may do good, though I have never found it of very marked efficiency.

When the flowers begin to grow *passee*, put the stems in hot water for five minutes, then cut the ends off a little and return them to the sand in which the water is about milk warm. When practicable, set cut flowers out in the dew at night.

A plate of sand, filled with short stemmed white flowers, makes a beautiful groundwork upon which to place scarlet geraniums, pink verbenas, or any other bright colored flowers. A little shading of green is, of course, necessary, and if arranged with taste, no handsomer table adornment can be imagined.

To Make a Bouquet.—The first thing to observe is harmony of color. They should be put together loosely and retain a natural appearance. If the stem is short, bind to it a little stick or piece of wire with a bit of white cotton thread, then when placing in the bouquet put a little damp moss at the end of the stem to feed it. The central flower, which should be large, like a rose or camellia, should have a larger and stiffer stem than the others. Fasten the smaller flowers around this central rose, as taste directs, being careful not to crowd. After having completed it, cut off the bundle of stems even and of proper length, and cover this with tin foil, or wind with white ribbon, leaving a loop, so that the bouquet may be suspended if desired. An edging or border of green ferns is most appropriate.

To Preserve a Bouquet.—Sprinkle it lightly with fresh water, and put in a vase containing soap suds. Each morning take the bouquet out of the suds and lay it sidewise in clean water; keep it there a minute or two, then take it out and sprinkle the flowers lightly by hand with water. Replace it in the suds, and it will bloom as freshly as when first gathered. Change the suds every three or four days.

To Preserve Funeral Flowers.—To preserve the flowers they should be fresh and firm, of pure white or delicate tints, without green leaves. "If a bouquet is to be preserved without taking the flowers apart, the leaves at least will have to be replaced with some other substitute, as the process does not apply to them as well as to the flowers themselves. Take paraffine of the best quality and melt it in a tin cup set in hot water, which may be kept boiling around it so as to keep the paraffine in a liquid state for use.

"Into this thin and transparent mass dip the blossoms, or, if found more convenient, brush them quickly with a small brush, so as to give them a very thin coat that will cover every part of each petal; and this will form a casing about them that will entirely exclude the air and prevent their withering.

"The transparency of the material renders this coating almost or quite invisible, so that the flowers present that natural appearance which constitutes their peculiar charm. Green leaves, if preserved in this way, must be coated with green wax, or with paraffine prepared with the addition of green powder paint. Chrome green is best. Lighten to any tint required by adding chrome yellow. Wax leaves, well made, may be used to very good advantage, or moss will answer very well for a background or foundation for the flowers."

Drying Flowers in Sand.—Flowers, such as pansies, pinks, geraniums, etc., may be dried in sand so as to be much nicer than those pressed in books. I use envelope boxes. Put in about an inch of dry, fine sand, then lay on the

flowers and cover with an inch or two of sand, and let them remain for a week or two. When taken out, they are found to retain all their color and shades of colors, and in a condition to be preserved for years. For winter bouquets nothing can be nicer than these sand-dried flowers.

The sand should be perfectly clean, and sifted so that there will be no lumps or gravel in it. It should also be fresh water sand. Put the stems of the flowers into it, so that they will stand up straight, and take a small sieve and sift the sand slowly over the flowers, taking care to spread out and arrange the petals in their natural condition, and to see that all the interstices between the blossoms are entirely filled up.

Sift the sand over them until all the petals and stamens are covered, shaking the box during the process, so that the sand will closely penetrate into every part of the leaves of the flowers. If the flowers are small, it will be sufficiently warm if the box is set in the sun one or two warm days; but if they are large, place the box in a moderately warm oven.

To Dry Wild Flowers.—Drying wild flowers requires great skill and patience, as these fragile blossoms of the field perish so quickly. The points to attend to are to dry the specimens quickly, thoroughly, and with a pressure that will not crush them. A good method is to place each specimen in a sheet of brown paper, and interpose several empty sheets between each that is filled, and press them gently for the first day or two, just enough to prevent the leaves and flowers from shriveling.

When the papers are quite damp, separate them, and spread them on the floor of a room where they can dry a little; then gather them together and place them again in the press, rather increasing the pressure. This operation should be repeated daily till the flowers are quite dry. A quicker and better, but more troublesome way, is to shift the flowers daily out of their damp papers into hot and dry ones, immediately pressing them down.

To Press Flowers.—Flowers may be preserved by laying them between blotting paper, covering these with cardboard and subjecting to a heavy pressure gradually applied. Remove them from under pressure in a day or two; carefully take away the paper, etc., except the blotting papers between which the specimens are placed; put these in a warm air to dry, while the removed cardboards are dried in the sun, or by the fire. When dry (but not warm) place them in the same order as before; put all under the heavier pressure for a few days, when (if not succulent) they will be dry.

Flowers of different colors require different treatment to preserve their colors. Blue flowers must be dried with heat, either under a case of hot sand before a fire, with a hot iron, or in a cool oven. Red flowers are injured by heat; they require to be washed with muriatic acid, diluted with alcohol, to fix the color. One part of acid to three parts of alcohol is about the proportion.

The best brush with which to apply this mixture is the head of a thistle when

in seed, as the acid destroys a hair pencil, and injures whatever it touches (except glass and china); therefore it should be used with great care.

Many yellow flowers turn green even after they have remained yellow some weeks; they must therefore be dried repeatedly before the fire, and again after they are mounted on paper, and kept in a dry place. Purple flowers require as much care, or they soon turn a light brown. White flowers turn brown if handled or brushed before they are dried.

Daisies, pansies, and some other flowers must not be removed from under pressure for two or three days, or the petals will curl up. The specimens to look well when dry should be gathered upon a dry day, and to be of value, should represent the flower, the leaves, and, in small plants, the root. When gathering specimens, they may be kept fresh by placing them in a close, tin box, or they may be snugly wrapped in a moistened newspaper.

Packing Flowers for Mailing.—The *Florist* says: "Always cut the flowers early, in the cool of the morning, and when in their prime. Take a piece of cotton wool, wet it, and wring it out, then twist it out about the stalk. If tin boxes are used they must not have sharp corners, or they will be rejected at the post office, but when properly made they excel all others in question.

"At the bottom of one of these place a piece of stout, brown paper (if thin, double it); let this be well damped, then lay the flowers carefully in, placing a piece of silver or tissue paper between each, to prevent their crushing each other. Over all place a piece of the same paper, and on this a little cotton wool. Cover the box with paper, and the flowers will reach the extremities of a kingdom in good condition.

"Let us add the modes of faulty packing to warn our friends against their adoption: First, placing the flowers in contact with dry cotton wool, which clings to them, and abstracts their moisture. Second, putting them in tin boxes, such as have contained lucifers, etc., which invariably get crushed in passing through the post office. Third, putting the cotton wool about them too wet, the moisture from which gets shaken over the flowers, and spoils their colors. Fourth, cutting the flowers after exposure to the sun, which insures their falling to pieces on the journey; this also occurs if the blooms are stale."

To Collect the Odors of Flowers.—Roses and all flowers containing perfumed oils, may be made to yield the aromatic properties by steeping the petals or flower leaves in a saucer or a flat dish of water, and setting it in the sun. The petals should be entirely covered with water, which, by the way, should be soft, or rain water. A sufficient quantity should be allowed for evaporation, and the vessel should be left undisturbed a few days.

At the end of this time a film will be found floating on the top. This is the essential oil of the flower, and every particle of it is impregnated with the odor peculiar to the flower. It should be taken up carefully and put in tiny vials, which should be allowed to remain open till all watery particles are evaporated

A very small portion of this will perfume glove boxes, apparel, etc., and will last a long time.

Crystallized Flowers.—Construct some baskets of fancy form with pliable copper wire, and wrap them with gauze. Into these tie to the bottom flowers, ferns, geranium leaves—in fact, any flowers except full grown roses—and sink them in a solution of alum, of one pound to a gallon of water, after the solution has cooled. The colors will then be preserved in their original beauty, and the crystallized alum will hold faster than when from a hot solution.

When you have a light covering of crystals that completely cover the flowers, remove the basket carefully, allow to drip for twelve hours. These baskets make a beautiful parlor ornament, and for a long time preserve the freshness of the flowers.

Training Hyacinths.—Get some stout paper and cut it into squares of a suitable size, and then roll them up into funnels, similar in form to the pointed bags in which grocers put moist sugar. They should be from six to nine inches long, and as soon as rolled into shape paste up the edge to keep them firm; if for plants in pots, the funnel should be large enough to go over the bulb and a portion of the soil; if for glasses, it should fill the outside of the upper rim.

The pointed end should be cut, so that when placed over the plants the light will come in at the top only; the flower stem will rise up rapidly to reach it, and as soon as it is as long as you desire, take off the funnel and allow it to bloom. After a little practice with this method, you will be able to grow them of a height which very much enhances their beauty where a number of them are arranged in a window.

Hyacinths in Sponge.—Hyacinths will do well either in glasses or potted, but the best way to fix them is to place a large sponge in a glass or earthen vessel and imbed a bulb in the center; keep the sponge slightly saturated with water and let it grow there. The vessel should be of the shape of a punch bowl to give the best appearance, and after the bulb is well started, grass seed sprinkled over the upper surface of the sponge will soon form a beautiful green carpet around the plant.

The Cranberry as a House Plant.—The common cranberry is said to be an attractive plant when properly cultivated in pots, and can endure a good deal of neglect which would be fatal to other plants. It needs to be kept cool and moist. A compost of muck and sand is the proper material for potting it in.

Although usually regarded as aquatic in its nature, it will not do to have the soil saturated with water. What it requires is that water shall be within reach of its roots, and that the soil shall be one through which water can rise readily by capillary attraction. Let the pot stand in about an inch of water, and it will thrive better than in any greater depth.

The cranberry roots readily from cuttings, or it can be propagated by bending down the sprays and covering them with the moist compost. It is beautiful at all times of the year, and especially so after the fruit commences to ripen. Its red berries will remain on the vine for a long time, and are highly ornamental.

Smilax for House Culture.—For a running vine I have found nothing more attractive for indoor culture than smilax, and it is not so difficult to make it grow vigorously as many suppose. The secret of success lies in having a moist atmosphere in the room. Plenty of sunlight upon it, and abundance of water around the roots, do not answer the purpose; the air itself must be humid, and kept so.

The plants should be started late in the fall, and they will flourish nicely all winter, if cared for properly. In the spring the bulbs should be removed from the earth and dried for summer keeping and rest.

To Train Fuchsias.—When a slip has grown six or eight inches high, nip out the top down to the last set of leaves; it will then throw out branches on each side. Let these grow eight or ten inches, then nip them out as before. The tops of later branches when grown the same height as the others, should be nipped out again. Procure a stick the size of your finger, eighteen inches in length, take a wire, twine back and forth alternately through holes made in the stick equal distances apart to form loops on two sides; place this firmly in the pot back of the plant, tie the branches to it, and you will have, when in flower, a beautiful and very graceful plant.

To Repot House Plants.—The best way to determine whether or not a plant needs repotting, is to carefully remove it, by inverting, holding the hand over the surface and hitting the edge of the crock a light blow by bringing it down upon a table. Examine the roots, and if they are matted about the sides and bottom of the ball, the plant evidently requires fresh potting. Then carefully reduce the ball of earth to about a third of its original bulk; single out the matted roots and trim away all that are moldy and decayed.

“Probably the same pot may then be large enough, but if it requires a larger one it should be about two inches broader for a middle sized plant; three or four for a large plant. If the roots are not matted, but the pots are filled with fibers, keep the ball entire and carefully plant it in a larger pot. At the top of a large pot, an inch, and of a small one, half an inch should be left for reception of water, without danger of overflow.

“A little gravel, charcoal, or pieces of broken pots should always be placed at the bottom for drainage. A plant newly potted must never be exposed to a strong sun. It should be watered and placed in the shade immediately and there remain till it is rooted, which may be known by its starting to grow.”

Double Flower Pots.—It is said plants thrive better in double flower pots than in single ones; that is, if the pot containing the plant is placed inside

a larger one with earth between the two. The outer pot prevents the sun from striking with too great force on the inner one, and thus keeps the plant moist, and secures for its roots a more even temperature.

Flower pots containing plants may be kept in boxes, the interstices between the pots being filled with sawdust. This arrangement is valuable in the heat of summer, for the box shades the pots from the rays of the sun, and the sawdust retains moisture around the plants.

A Cone Greenery.—Take a dried cone or burr of a white pine or a fir tree, which has shed its seeds, and sprinkle various kinds of grass and canary bird seeds into its vacant openings; then cover them slightly with fine scouring sand and place the cone in a wine glass or a small vase filled with water.

In a few days the cone will have absorbed so much moisture that its circles will close up; in a few more the seeds will sprout, and soon tiny shoots will form a pyramid of living green, beautifully relieved by the dark brown pedestal formed by the pine cone; and if the water is renewed as it evaporates, the grass will grow and even flower in the miniature garden.

A number of different sized cones can be procured and placed in a shallow glass preserve dish, when the effect will be more beautiful, because many varieties of grass can be sown.

A Goblet Greenery.—Take a goblet with the stem broken or cut off so that the bowl will be perfect; take coarse red flannel, the redder the better, stitch it neatly around the bowl or goblet, so as to cover it completely on the outside; dip it in water, so as to wet it thoroughly, then roll it in flaxseed. The seed will stick in and on the flannel. Be sure that the seed is distributed evenly, then stand it on its mouth, or large end, in a small saucer or small plate; put water in the small plate or saucer, and renew or add to it as it absorbs. Never let the vessel get dry, nor suffer it to chill or freeze. It can and will grow in any part of the room, and will be a deep green with red ground.

A Bottle Greenery.—Take a bottle with a tapering neck, sew thick flannel pretty tightly round it, fitting it closely, but not too tight. Saturate the flannel with water, roll it in mustard seed, or flax seed, or land cress seed, till it is well covered with them. Then tie a cord around the neck and hang it up in the window of a warm room. Sprinkle it every day, or dip it into a vessel filled with water, now and then.

Wheat Head Greenery.—Take a small bundle of nearly ripened wheat heads, with stalks half a foot long; lay the bundle in a basin of water until well soaked, say twelve hours, then put them in a vase or hyacinth bottle and set in a dark closet until the kernels of grain sprout. When brought out to the light it will grow and make a very pleasing and novel room ornament.

Mimic German Ivy.—A vine may be produced from the sweet potato which very much resembles the German ivy. It is cheap and novel. Take a large, well shaped sweet potato and place it root end down in a tumbler or gob-

let and put in as much water as the glass will hold. In a short time roots will reach out and sprouts begin to appear, and in the course of a few weeks there will be a nice growth of vines.

If the potato is large enough or the glass small enough to prevent the root end of the former reaching the bottom of the tumbler, it will be better, as it gives room for the rootlets to ramify and feed. The glass may be set upon a bracket beneath a picture and the vines trained up and around the frame, or it may be kept behind the picture. If there is not enough "taste" in this manner of growing, the potato may be imbedded in a large sponge, as directed for the hyacinth bulb.

A Miniature Oak.—An acorn suspended by a piece of thread within half an inch of the surface of water in a hyacinth glass, will, in a few months, burst and throw a root down into the water, and shoot upward its straight and tapering stem with beautiful little green leaves. A young oak tree, growing in this way on the mantelshelf of a room, is a very interesting object.

A Hanging Garden.—Take a white sponge of large size and sow it full of rice, hemp, canary, grass, and other seeds, then place it in a shallow dish, in which a little water is constantly kept, and as the sponge will absorb the moisture, the seeds will begin to sprout before many days. When this has fairly taken place, by means of cords the sponge may be suspended in a window where a little sun will enter. It will thus become a mass of green foliage, and should be refreshed with water daily, so as to be kept moist.

LEAF ORNAMENTS.

Skeleton Leaf Bouquets.—Leaves for a skeleton bouquet should be gathered when in full vigor, and the first thing to do after this is to decompose.

Process of Decomposition.—Dissolve a sufficient quantity of washing soda in soft water to make a strong solution; put it in a brass or porcelain kettle, throw in the leaves, and let them boil for five or ten minutes. By pressing one between the fingers, rubbing it lightly, you can tell whether the pulpy matter is in condition to be removed. If it rubs off easily, take the leaves out of the kettle, and put them into cold water.

Have a basin of clear water ready, take them one by one, and with gentle and very careful pressure—just under the water—remove all of the tissue. Be sure that every particle is off the veins. Float them on pieces of writing paper, and remove from the water, when they can be laid aside, ready for bleaching.

How to Bleach Leaves.—Get half a pound of chloride of lime (strong) and place it in an earthen vessel or pitcher; add three pints of soft, cold water,

and stir carefully with an iron spoon; press in so as to mash the lumps well against the sides of the vessel.

Keep covered, and allow it to stand in a cool place until the lime has precipitated upon the bottom of the vessel, which will be done in about half an hour, except a small portion that may remain floating on the surface, which remove with a spoon, and pour off the clear liquid into a bottle; cork up tightly and keep in a cool place.

When ready for bleaching, take a glass jar with a wide mouth, place the leaves in, cover with water, and add the bleaching solution in the proportion of two tablespoonfuls to a pint of water. Cover the jar tightly and put it in a warm place. It takes from thirty minutes to twenty-four hours for bleaching, according to the leaf.

Ferns require the longest time. They are not skeletonized. Make a collection of the smallest, most delicate kinds, place them between the leaves of a book, and allow them to remain there until perfectly dry, when they can be removed and put into the bleach. Watch the leaves through the glass and take out when done.

They must be thoroughly washed, by changing the water, and let stand in water several hours after taken out of the bleach, or they will become yellow again. Dry them by pressing between folds of linen. For stems, stiffen thread with gum arabic.

Time for Gathering Leaves.—Silver poplar, gather from June to September. Aspen poplar, June or July. Linden and weeping willow, June to July. Everlasting pea, any time in the summer. Elm, June or July. Dwarf pear, sassafras, beach, hickory, chestnut, rose (common dark velvet), July.

Of green house plants, camellia, cape jasmine and orange. To the foregoing tree leaves might be added the quince, horse chestnut, wild cherry, barberry and boxwood.

The pear leaf and common climbing ivy are most easily prepared, and may be classed among the very prettiest leaves. Of seed vessels, take Jamestown weed, wild cucumber, lobelia, skull cap, shell flower, poppy pod. Also the seed vessel found on what is commonly called ground cherry.

The collection of leaves, etc., should be six times as large as you expect to use when they are prepared, because so many are unavoidably made imperfect during the process.

Arrangement of Skeleton Leaves.—When enough perfect ones are obtained, arrange according to fancy. Their beauty and delicacy are especially perceptible when arranged over a black cross. The stalk and branching parts of the ground cherry weed will bleach quite white. Take a small irregular section of this, with some seed vessels connected if possible, and on this as a center the leaves may be arranged in pretty bouquet form. In either case they must have a glass covering.

To Take Leaf Impressions.—Take a sheet of well calendered letter paper and coat it well with sweet oil. After it has thoroughly penetrated, wipe the sheet dry, and expose it to the air for awhile. Then take a lighted candle and move the paper over it, in a horizontal direction, so as not to touch the flame, till it is perfectly black.

To take impressions, lay the leaves carefully on the blackened side of the oiled paper, and a piece of clean paper over them, and rub with your fingers equally in all parts for half a minute; then take up your leaf, and be careful not to disturb the order of the leaves. Now place it on the paper on which you wish to have the impression; then cover it with a piece of blotting paper, and rub it with your finger for a short time, and you will have an impression superior to the finest engraving.

The piece of black paper will answer to take off a number of impressions. The principal advantage of this method is, that the paper receives the impression of the most minute veins. The impressions may afterwards be colored, if it is so desired.

Waxing Autumn Leaves.—In preparing autumn leaves for their various ornamental uses, a frequently employed method is to coat the surfaces with oil or varnish; but I believe it is universally conceded that this makes their hues unnaturally bright, and also that when put up in bunches or fastened to picture cords they will inevitably curl so as to afford you as full a view of the back as of the face of a leaf. The following plan, in my experience, obviates both of the above objections:

The leaves are not to be pressed and dried in books, but freshly gathered; use an ironing board or table and moderately heat a perfectly smooth flat iron (a polishing iron is best); rub a piece of yellow beeswax over the face of the iron and press each leaf until dry. The wax imparts just a natural gloss and stiffens the leaf sufficiently to prevent curling.

Another Method.—Another and similar plan is to place the leaves between sheets of paper, press with an iron and then draw them through wax melted on the surface of a hot plate. In this way they get a thicker coating of wax, and consequently a dimming of their colors, but all possibility of curling is obviated.

Leaf Butterflies.—When collecting autumn leaves, secure some of the very large and exquisitely tinted from the maple—such as are generally rejected because of their size and ragged edges—get them if possible in light green and lemon tints dotted with scarlet; these being butterfly hues, will make the deception more complete.

Have a pattern of a butterfly, which is readily made by tracing its shape on tissue paper from any illustration; lay the pattern on the leaf, using the center vein for the back of the butterfly; cut and fasten it to a curtain or anywhere you want your butterfly to alight.

MOSESSE AND MOSS ORNAMENTS.

Forest Mosses.—Many girls who live in the country, in the midst of nature's wild beauties, do not fully appreciate the loveliness of the things around them. Ferns, grasses, flowers and mosses in the primitive forests are, many of them, possessed of the most exquisite structures, as close observation will verify. It is only when one has been taken away from the wild beauties that their worthy, charming peculiarities and perfections are realized. The tree moss, coral moss, rock moss, fir moss, club moss, etc., are all pretty; at least some varieties in the different families are.

To Preserve the Color of Moss.—Any fresh green mosses, of which we find numberless lovely shades, may be gathered during the summer and dried so as to retain almost their full color and perfectness. Gather the moss carefully and lay it in a dark cellar, top downwards upon the earth. Let it remain so until perfectly dry, when it can be used in the make up of various rustic ornaments. It will mingle prettily with tree moss in making frames, pressed leaf bouquets, wreaths, etc.

How to Dye Moss.—Gather the richest and nicest moss you can find. The feather moss is the prettiest for this. Carefully remove all dirt and sticks; take an ounce of chrome green and mix with one half ounce of gum arabic dissolved in half a pint of water. Heat the mixture, but not boil. Dip the moss in while warm; pick out the leaves and sprays, and lay upon a paper to dry.

Care must be taken in using the paint, as it is poisonous. If you have a large quantity of moss to dye, and the green does not seem dark enough, prepare a little more, and redip the moss. Family dyes may be used; bottle green and leather colors are suitable.

Crystallized Gray Moss Wreath.—Cut a circle out of pasteboard and have it of sufficient width to sew the moss on. Fasten a wire around on one surface of it to hold it in perfect form. Before sewing dampen the moss, as it is otherwise too brittle to bear handling.

In collecting, select that which is of coarse, open texture and stiff, as it will crystallize better than any other. Allow the wreath to become perfectly dry before subjecting it to the alum solution, which is made by dissolving a pound of alum in a quart of hard water, heated.

When cool the solution is ready for use. Hold the wreath in one hand over the kettle containing the alum water and with the cup repeatedly dip the water up over it, being careful to moisten the pasteboard as little as possible. By this plan more frost-like crystals will be formed than if the wreath were immersed in the solution.

An anchor or cross may be made after the same general plan which will look as prettily as the wreath, and be perhaps more appropriate in certain positions.

Design for a Moss Picture.—Take a piece of crayon board the size you wish, draw the outlines of your design, paint a sky, gather different shades of moss and stick it on with thick varnish. An old tower, with a cross at the top, and bridges, can be made to look pretty if tastefully arranged. Take small sprigs of cedar to represent trees; arrange it to represent autumn scenery.

Any person of artistic taste can make handsome pictures in this way, or by suiting his own fancy. To represent rocks, take a small piece of wood, use a little paint; have a deep frame made and put a glass over it, and it will be pretty for any sitting room in the city or country.

To Make a Moss Frame.—A very pretty frame can be made of dry moss of a pale greenish color, generally found on beech trees and old logs in the woods; the kind that has a rough and dingy appearance; this is sometimes found also on decayed fruit trees as well as in the woods.

Take soft wood, such as pine, or poplar—as wood is preferable to pasteboard on account of the warping of the latter; shape it in any fancy design you wish; make it smooth, and do not leave any knots or rough places on the wood work, as it will destroy the evenness of the surface.

When you have done this, prepare the paste—flour paste is the best for the work. Stick the pieces of moss on as thick as you can, or at least until the woody portion of the frame is entirely hidden. If it is preferred, you can place a shell, a cluster of acorns, or any other similar ornament at the corners.

To Make a Moss Cone.—Procure a cheese box and fasten to the center of it an upright staff sixteen inches high. Stretch over it a piece of coffee sack-ing, like forming a tent, tacking it down to the bottom inside, leaving a space of three inches all around. Fill this space with soil, mix in water equal parts of clay and ashes to the consistency of mortar, and plaster over the cone, cover it while wet with moss of different shades of green from the woods. Plant ferns all around the bottom of the cone in the soil, and then cover the soil with moss. Keep this well watered and it will be beautiful.

To Make the Moss Hat.—Take a man's old straw hat and rip three or four rows of braid from it, then fasten the ends on firm, and make a handle of it. Put pasteboard in the inside of the crown, then line it with white paper, and cover it with moss.

Flowering Hyacinths in Moss.—The hyacinth will revel in a bed of damp moss. The moss may be either used to fill pots, window boxes, or wire or other baskets. A wire basket in which four or five different varieties of hyacinths are planted, presents a very attractive appearance when suspended in a window or other part of the room.

In filling the moss into the pots, boxes or baskets, it should be pressed moderately firm, and the hyacinths planted with one-third of their thickness above the surface.

After planting, the moss should be watered sufficiently to thoroughly saturate

it, and after the surplus water has run off, the baskets or other receptacles are to be placed away in some dark, cool place, such as a cellar, or dark closet, where the temperature does not exceed 50 degrees.

In five or six weeks after planting, the moss will be found to be filled with roots, and the bulbs may then be taken from their dark quarters into the light; and if kept in a temperature of 60 or 70 degrees, they will flower abundantly in three or four weeks after; the moss must be kept moist at all times.

The advantage of using moss for hyacinths, etc., is in its lightness and cleanliness in handling. The wire baskets, especially, when filled with moss, present a much more pleasing appearance than they would if filled with soil.

Window Moss Transparency.—A pretty transparency for the window is made thus: Take a pin and prick on white paper the outline shape of a cross, surround with moss, then place this between two panes of glass, and bind together with a ribbon.

The Plate of Moss.—Fill a rather deep plate with some of the nameless but beautiful silvery and light green and delicate pink mosses, which are met with in profusion in all the swamps and marshes. This can be kept fresh and beautiful as long as it is not neglected to water it profusely once a day.

It must of course, be placed in the shade, or the moss will blanch and die. In the center of this clump of moss should be placed some curious lichens and pretty fungus growth from the barks of forest trees, and a few cones, shells and pebbles.

The Tumbler of Moss.—Cover a common tumbler with cotton cloth, and then fasten pretty moss to that until it is completely covered. Then take a saucer and glue dried moss to its edge and outer surface and into the saucer set the tumbler, filling it and the remaining space in the saucer with loose earth from the woods. Plant the former with a variety of ferns, and the latter with wood violets.

On the edge of the glass also plant some of the nameless little evergreen vine, which bears scarlet berries, and whose dark, glossy, ivy like foliage will trail over the fresh blue and white of the violets with beautiful effect.

Imitation Moss Baskets.—The appearance of moss on the outside of ladies' baskets is produced by worsted of the same kind as that used for embroidery in worsted. Four or five shades of green, and as many of brown, in regular gradations, should be selected; the darkest shades of green being of an olive tinge, and the lightest of a yellowish hue in preference to grass green, which has not the yellow autumnal tint of the colors before mentioned. One skein of each color is sufficient for a pair of baskets.

The shape or body of the basket is formed of pasteboard, and is usually round or oval, and made with or without a handle across, according to fancy. The pasteboard shape is covered inside and out with green silk; and if a handle be affixed, it should be sewn on outside, where the joining will be covered by the moss, so that the silk may appear neat within.

The worsted of each color should be wound into a separate ball, and knitted either flat or round like a stocking ; a piece of thread should then be passed, by means of a needle, through the last row of loops or stitches, and fastened at each end, in order to prevent the knitting from unraveling.

The knit piece should then be thoroughly wetted and pressed with a warm iron until thoroughly dry. After this, the respective pieces must be unraveled and made up into small bunches, which are to be sewn so thickly on the silk, with which the outside of the basket is covered, as to leave no apparent space between them.

Each bunch should be composed of about three shades of color, made up in the following manner : The several pieces of knitting being selected, a few rows of each are to be unraveled, and all the ends, being taken up at the same time, are to be held between the thumb of the left hand and the side of the hand, as low and near the joint as possible ; the upper part of the thumb being then slightly relaxed, the worsteds are, with the right hand, wound around the thumb and finger of the left hand like a figure 8, and held in that position while the middle, including the ends with which it began and left off, is sewed together with a piece of silk.

The bunches should be placed in heaps, according to their respective shade, and sewn on the basket, according to taste, intermingling the views, so as to avoid the appearance of formality.

SHELL WORK.

Variety of Shells.—Many shells possess the loveliest tints upon their under surface ; some of rich crimson, deep orange, yellow, and rose colors, others black, with lines and spottings of various intense or delicate shades ; while many are furnished with an opalescent, pearly coat, that appears grievous to the lover of the beautiful to cover with cement and fasten down away from view, Mrs. Caroline S. Jones furnishes the author of this book with the following valuable suggestions and practical facts concerning the use of shells for ornamental use :

Shells with Mirrors.—An elegant object may be made whereby not only all the surface beauty of the shells is exposed, but their exquisite linings are reflected back and appear shimmering, as it were, in a pellucid lake. To make these charming ornaments, you require a stand covered with mirror and one of the glass shades used so largely for shielding various ornaments from dust and prying fingers. These may be, in this case, either the tall kind, or those sold under the name of pond lily shades.

Around the edge of the mirror, within the space which the shade will cover,

arrange a circle of sea-moss weeds, little shells and fragments of pretty rock coral and a sprinkling of "frosting."

In the centre place a stand of wood, made of a central pole, as high as the shade will admit, with two or more hoops (of wood) fastened to four arms extending out from the central post. For a pond lily shade of largest size, this central support should be about one inch, or even less, in diameter.

Tragacanth Cement for Shells.—Cover all the woodwork with moss, fastened on with shell cement, made by dissolving gum tragacanth and a little powdered alum, until thick as sirup, then adding to each teacupful a teaspoon half full of sugar of lead and plaster of Paris, to form a putty like paste.

Gelatine Cement for Shells.—Take common sheet gelatine and dissolve it in sufficient water to make a mucilage as thick as sirup. Use a small quantity at a time, with sufficient plaster of Paris to make it very thick.

The Shell Pyramid.—The shells are arranged to form a pyramid, with the largest in the centre, and the small ones grouped around and below it in successive tiers. A high and wide shade will accommodate five to eight tiers, but a pond lily stand will not hold more than two or three.

The shells cemented to these circles present a most unusual effect, each under surface being distinctly reflected from the mirror below, with its mossy surroundings, upon which they appear to float as upon a sheet of water.

Boxes and Brackets of Shells.—We have taken wooden cases and frames of various kinds, and, covering them with shells, made elegant ornaments of them. Many persons have an erroneous idea that shell work must necessarily be fragile; whereas we have the most delicate specimens, which, being properly cemented, withstand the constant use of the feather duster, and even a careful washing sometimes.

Ornamental elegancies may be covered and embellished with shells, cemented on or together so securely that they are quite as strong as though made of stone china.

The plaster may be sufficiently thick to support the shells, but if too thick will have a clumsy appearance, and the parts exposed will not show as good a gloss when polished. It may be tinted with lavender by adding a little blue powder color; violet by red and blue; pink with rose pink; salmon with Venetian red; brown with burnt umber, etc.

Grouping Fancy Shells.—Success in this work mainly depends on taste in arrangement. For different purposes the arrangement will necessarily vary, but as a general rule, it is best to assort the shells into groups of form and color. Take, as a rule, those offered for arranging our flower beds—that of contrasting colors and shades of color—the glittering, opalescent, silvery, pale lavender and pale pink tints of pearly hue, have an equally superior value.

Take oval, oblong and other figures, molded or bordered with shells of suitable size and color, and as a rule apply them to plain surfaces, and they will

produce fine effects. Damaged, chipped and mended china ornaments may thus be renovated and made quite elegant; while pasteboard toilet boxes and like framework may be made into sets of most artistic appearance.

Ornamenting Clocks with Shells.—We have taken one of the Gothic clocks with walnut cases, which are now in general use, and made it really elegant by covering with shells. First rub the whole surface with emery paper until quite rough, then cover spot by spot with cement, having the shells assorted in boxes, as just recommended, and place the shells where most effective.

A good plan is to make a sketch upon a sheet of paper cut in the form of a clock. There are some shells which form elegant feet for such an article; these are the beautiful univalves, curved into spiral scrolls.

Now, with the halves of pretty colored bivalves, such as the exquisite "rose leaf," form a set of ornaments for the arch, with a rosette in the center, and a chain work, or series of tiny rosettes, down the inner edge; outside of these, long spiral univalves, arranged with the point projecting.

Cover the pointed turrets with small shells artistically arranged, or use long, spiral turitella, one for each. Arrange flowers or mosaic figures upon the center of the door, and small figures in the corners, with some border embellishment. Then fill in all the ground with small rice shells, not allowing a space the size of a pin point to remain bare. Use a small, pointed instrument, and press each little shell well into the cement.

Below the door fasten the half of an oblong bivalve or other beautiful shell, selecting one of great beauty, with pearl lining, which makes a receptacle for the key, etc.; while just above this arrange a group of shell flowers, or a little parian sea god, which may be procured from the fancy stores.

Make a border of small black snail shells and yellow bivalves, then white univalves with pink bivalves within it. These arranged tastefully appear like a rich mosaic. The shells should first be carefully polished, first rubbing with pounded pumice stone, then polishing with oil and pulverized tripoli on a soft pad. When completed, varnish the surface with copal.

Etching Sunken Letters on Shells.—Initials, names, mottoes, floral and other designs can easily be made on ivory or shells by the simple use of acids. First cover the ivory with a thin but even coat of beeswax, or of a composition made of the following ingredients: One ounce white resin, one-half ounce white wax, and two ounces of asphalt.

After the ivory is thus prepared, draw the pattern selected with a finely pointed instrument or a sharp needle through the wax, so as to scratch the ivory slightly. Care must be taken that the coating is penetrated in every part of the tracery, or the work will be unsatisfactory. Then cover the surface with strong muriatic acid, allowing it to remain about four hours. Wash off with water, and rub off the wax with turpentine, when the drawing will appear as if cut with an engraver's tool.

Before attempting a large and elaborate design, it is best to experiment on a small bit of ivory, as, owing to the uncertain strength of the acid, the time required may be longer or shorter. Shells require a weaker acid than ivory. Strong acetic acid, or diluted muriatic or nitric, serve equally well.

A thin coating of common varnish is frequently used to protect the shells, and in order to clearly see the design the varnished shell is blackened over a flame before beginning the drawing. The varnish is washed off with turpentine.

Etching Raised Letters on Shells.—Instead of sunken letters and figures, raised ones can be produced on shells by making the designs with varnish by means of a fine brush. Then, when the acid is applied, it will dissolve the surface of the shell around the varnished lines, leaving the design in relief. No fixed rule can be given as to how long the acid should be applied to shells, as they vary greatly in hardness. Exercise your judgment.

By this etching process, many ivory articles can be beautifully decorated, and various shells made more ornamental. Even a pair of common clam shells, bleached to pearly whiteness, with a raised monogram or motto on the outside, and a dainty marine view painted in delicate water colors on the inside surface, would be a unique and highly prized gift.



VARIOUS FANCY ARTICLES.

Gilded Macrame Work Basket.—Use Macrame cord No. 12, and begin crocheting as for a lamp mat, in solid rows, all long stitches, without any chain between, and widening only enough to keep it flat; do not have the mat the least mite full. This is for the bottom of the basket, and as a guide for the size, and to shape the sides of the basket, select a tin pan seven or eight inches in diameter, and two and one-quarter or two and one-half inches deep.

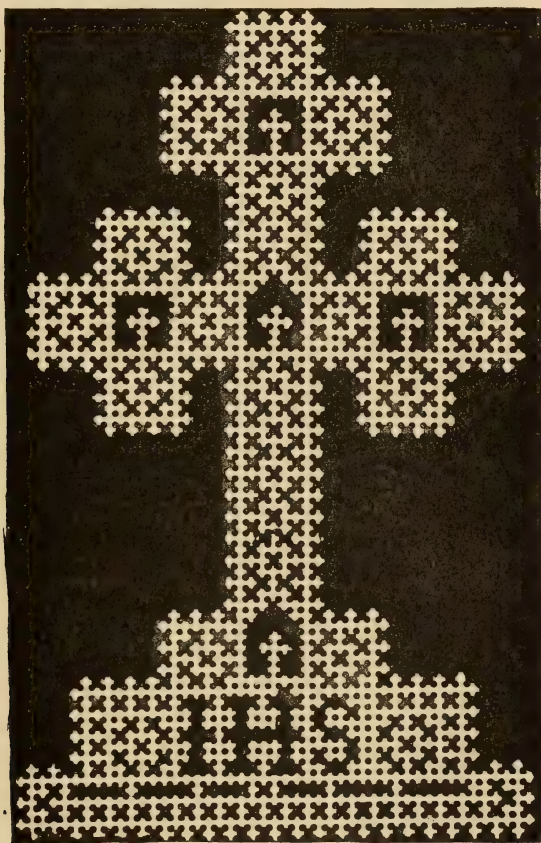
Lay your mat on the outside of the bottom of the pan, and when you have crocheted it the same size, widen the next row a little more and shape the sides of your basket by the sides of the pan, making sure, by frequent trials, that you are not widening too much, and so having the sides flare too much.

Finish the top edge with a scallop, and having drawn the basket over the outside of the pan, proceed to stiffen it by thoroughly saturating the cord with thin, hot glue. Before the glue is thoroughly set, remove the basket from the pan, and if its inside surface is not coated with glue, brush some over it.

When the glue is quite dry, the basket will be found as firm as willow, and the outside must have a coat of gilding or gold paint. Line the inside with pink, blue or golden brown satin, make a shallow pillow-shaped cushion of the same three and one-half inches long and two inches wide; paint or embroider some forget-me-nots or tiny flowers on it, and tack it to the side of the basket with a

full bow of satin ribbon. A smaller basket, say five inches in diameter, similarly made, constitutes a dainty holder for spools of silk or thread.

Natural acorns, that are given first a coat of chrome yellow, and then gilded with gold paint (see page 529), make a unique addition to a basket, tacked to the side or attached to a satin bow.



PERFORATED CARDBOARD CROSS.

Perforated Cardboard Cross.—The illustration furnishes a complete pattern of this cross, and represents it exactly as it will look when cut from the cardboard and laid over black velvet or cloth, excepting that it will be larger than the engraving. If the purpose is to frame the cross, get white cardboard and lay it on a smooth piece of table or wooden board.

Have sharp the small blade of a penknife, and referring to the illustration, begin at the top to cut out the bits of cardboard between the holes. By counting

the holes, which are plainly designated, there will not be any mistake in reproducing a cross like the engraving. It has a pretty effect laid over black cloth or velvet and framed in a passepartout, which is not expensive.

If it is desired to use the cross for a book mark, get very fine cardboard, which will make the cross smaller, and when cut, tack it to the end of a blue or rose colored satin ribbon, which has first been fringed out the depth of an inch. The cross is to depend from the edges of the book when closed.

Catch All.—A slender tumbler of pure crystal or tinted glass, with an outside cover crocheted of Macrame and gilded, and finished with a silk ball at the bottom and ribbon handle at the top, makes a pretty receptacle for trifles, or for water in which to grow ivy.

Flower Crock Cover.—Covers for flower crocks are crocheted of Macrame cord, stiffened and gilded. The shaping is perfectly simple to one who has even a slight knowledge of crocheting.

Case for a Ball of String.—Crochet six chain stitches of Macrame cord No. 12, join and then crochet three chain, which is equal to one long stitch, and into the circle formed by the first six chain proceed to put thirteen long stitches without any chain between, and join to the three chain; this gives an unbroken circle, and to effect this in each succeeding row, crochet three chains first upon starting a row. Have a whole ball of twine, or one of pink or blue wrapping cord, and continue to crochet a cup-shaped covering for it, regulating the size to suit the ball of string, which is done by not widening nearly as much as for a flat mat, but just sufficient to increase the size and keep it cupping. Crochet the cup to cover a little more than half the ball of string, which will require about six rows. Now make another cup exactly like first by count, stitch for stitch.

Stiffen these by saturating with hot, thin glue, and when dry, gild with gold paint (see page 529). Then into one of the cups lay your ball of string and pass the end of it down through the hole in the bottom, whence it will unwind from the center of the ball. Lay the other cup on top of the one containing the ball, so that the two edges meet and hold them together by passing a half-inch blue or pink ribbon in and out from one to the other, ending with a bow. attach a bow and loop of ribbon to the top of upper cup to hang by.

Velvet Panels.—The bareness of parlor door panels may be given an effective and artistic relief in the following manner: Cut a piece of thin board or heavy pasteboard a trifle smaller than the panels, cover with black velvet and arrange on it bright autumn leaves. Maple and small sumac leaves, which adopt such brilliant hues when frost comes, are desirable. If the leaves are waxed, as described on page 685, they will produce the best effect against the black velvet; or autumn leaves made entirely of wax, particularly woodbine sprays and berries, are beautiful. Fasten the velvet panel with invisible tacks or black pins to the door panel which it fits. Dark olive or black cloth can be

used instead of velvet; a black velvet panel, say fourteen inches long and seven and one-half inches wide, is handsome, resting on a small easel or hung upon the wall. A cluster of the dried pink marguerites, to be had at a florist's, with a few tiny ferns, is particularly pretty upon black, and upon blue velvet a cluster of dry white field daisies. For these wall panels, it is first necessary, of course, to have the panel cut from thin, dry board—with edges beveled—which cover with the velvet.

When natural flowers and leaves are not obtainable, a fine quality of artificials are used upon these panels, as some glowing poppies on dark blue, or pink crushed roses on wine velvet.

Glass Door Covering.—In case of a half-glass door, when it is desired to exclude observation from the other side, or for the sake of the exquisite effect it has in a delicately furnished room, blue satin is employed in the following manner:

Having a sufficient quantity of blue satin, proceed to attach it to the wood-work surrounding the glass with gimp tacks, laying tiny pleats one inch and a half apart. Cover these tacks and edges with upholsterers' gimp. Gather the satin in the center of the glass panel, drawing tight and covering raw edges with a rosette of bias satin.

Thermometer Panel of Plush.—Have a panel cut ten and one-half inches long and seven and one-half inches wide, from dry white wood or cherry lumber, planed to one-half inch thickness. Have the edges beveled one-half inch on front surface nearly to back edge. Procure a quarter of a yard of plush and in one corner embroider a small spray of flowers; a bunch of daisies or clematis on blue plush and wild roses of satin or ribbon on wine plush are effective.

After the embroidery is done, spread the plush smoothly on the wood panel and hold it so by means of pins driven in lightly an inch apart and about half an inch back from the edge all around. Now turn the panel back side up on a table and fasten down the edges of the plush with good mucilage or glue; a piece of black paper muslin can then be fastened on in the same way, so as to cover the entire back part and so conceal the rough edges of the plush.

Do not remove the pins for half a day at least, to be sure the glued edges are thoroughly dry. Now get a small thermometer and use only the metal plate which supports the mercury bulb and tube, the tin or wooden frame being removed. This can be obtained without frame, if you desire, where artists' materials are kept on sale. Fasten the plate to the plush panel by very small tack or tiny ribbon bows. Place it in an upper or lower corner, as the space seems best suited to it with reference to the spray of flowers; complete the panel by an artistic bow of satin ribbon on one corner and hang by means of a loop of ribbon tacked on the back. Velvet can be used instead of plush and the size regulated to suit the fancy,

To Repair a Thermometer.—Not unfrequently a thermometer gets injured by falling; the tube perhaps not broken, but the mercury separated or is broken up in the tube. In such a case, place the bulb of the thermometer in a cup of water on the stove; then allow the water to heat until the mercury is forced to the top; then remove, and when it settles the column will go down unbroken.

To Make a Fan Wheel.—Get three common paper fans with black sticks. Select them all of a deep cardinal shade, or have one cardinal, one pink and one black. Remove the wire which holds the black sticks together at the end, which is grasped by the hand in using the fan. Remove also the two outer black sticks which extend from the open to the closed end of the fans, one on each side.

Have ready a piece of pasteboard four or five inches square; a portion of an old box will answer. Close one of the fans at the paper end, grasp tightly between the thumb and finger, and fasten it so with a few stitches; then with a few more stitches tack this end of the fan to the center of the pasteboard. At the point where the black sticks issue from the paper part, spread the fan to its utmost capacity, and hold it so by stitches passed through into the pasteboard.

Repeat this process with the other two fans, and you will have a wheel-shaped affair which is to be finished off by passing inch or inch and a half wide satin ribbon in and out between the black sticks close to the paper part of the fans. It must be understood that the hand end of the sticks are now the outer surface. End the ribbon with a bow at the side, and place a pretty bow over the point where the fans were tacked to the center of the pasteboard.

A gold cord or an extremely narrow ribbon may be passed through the rivet holes, which will be found in the sticks about one inch from their ends. The ornament is just as effective without this addition, however. If pink, black and cardinal fans are used, wine satin ribbon is a good combination, and with all cardinal fans, gold color ribbon. Two or three rows of inch-wide ribbon may be used instead of one, and colors selected to please the fancy. These fan wheels are usually placed high up on the wall, over doors, etc., and make an effective ornament.

Horn Cornucopia.—Some cow's horns are very beautiful, so smooth and rich in coloring that they cannot be improved by etching, carving or staining. When it is not the good fortune to get one of these, it may be made ornamental by cutting any design you like upon it, after having first softened the horn by allowing it to lie in a solution of caustic soda or potash. The lye may be made almost any strength; the weaker, the longer it will be necessary for it to remain in the solution. Wash when taking it out, and cut the design; then dry and color.

I have never tried the experiment, but believe that the etching process, as given for ivory and shells, page 691 will answer as well for horn. For methods

of staining, see pages 210 and 211. To dye horn the aniline colors may be used. After the work of cutting and staining has been completed, put in two picture frame screws, as shown in the engraving, and attach a ribbon to correspond in color to the horn, to suspend the cornucopia by.

The end should be finished by a piece of silk or satin put on so as to gather, as illustrated. This end material may be fastened to the horn by the use of glue or good mucilage. The contraction is made by means of a narrow ribbon passed through the silk in and out.

To Make a Perfume Satchet.—Take three-eighths of silk of any light shade and quilt it in tiny diamonds; of this cut two diamond-shaped pieces, also two of cotton batting; have ready an ounce of dry perfume, place it between the layers of cotton, and inclose the whole within the two pieces of silk by sewing together the edges. Finish with a quilling of ribbon and bows.

Instead of having both sides of the satchet of quilted silk, one may be embroidered with an initial or small bouquet. To derive full benefit of the perfume, the satchet should be kept in a perfectly tight glove or handkerchief box.

Imitation Snow Ball.—An imitation of the snow ball shrub may be made very cheaply, and, if rightly arranged and proportioned, very pretty. Set up a wooden standard of the desired height, say twenty inches, and the size of the little finger; through this make angling holes with a small awl, and into these put wires for branches of various lengths, from eight to fifteen inches. The wires should be bent arching a little, and large enough to support themselves when laden with artificial leaves and flowers.

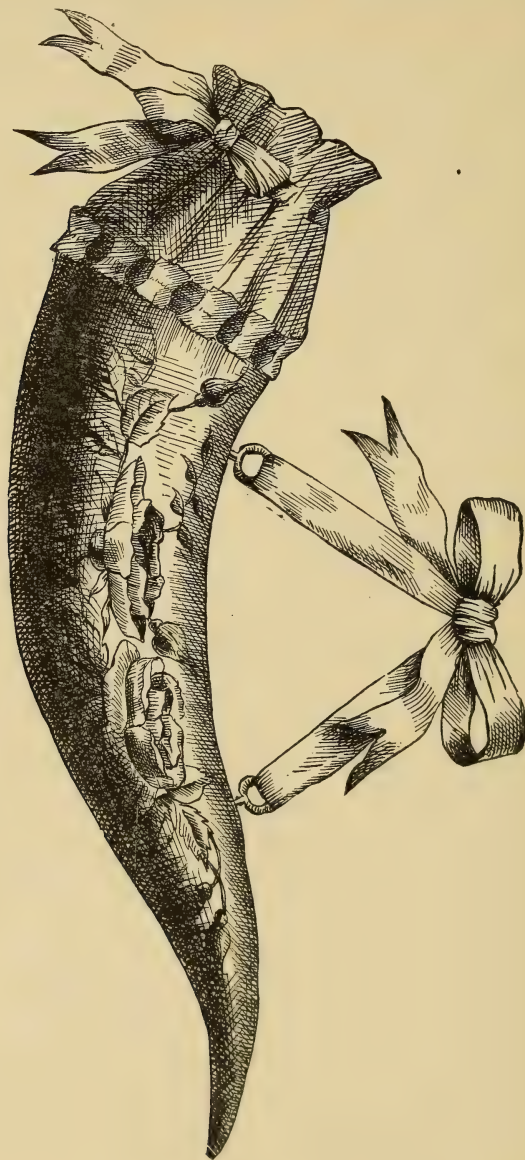
The branches should be set nearer perpendicular than horizontal; nature will be the best guide. Wind the whole with green paper, and put on leaves made of the same material, carefully patterned after the natural.

For the snow balls, make small balls of candle wicking, and cover them with the scrapings of cow horn. The horn should be clear and white, and the scrapings carefully fastened on to the ball until it is entirely covered. Nothing more will be required to make the shavings stay upon the ball than to hook the ends into the cotton.

To Copy Embroidery Patterns.—It often happens that those who do stamping for embroidery and braiding at fancy stores, do not have the patterns desired or adapted to certain parts and corners of garments of different sizes, and it is important to know how to copy patterns that are to the purpose found in the fashion journals. We often see exquisite designs, particularly of braiding, intended for various parts of a lady's apparel and fancy articles.

To copy these, first make a drawing upon paper, if it is desired to preserve the original print, then lay the drawing upon an even cloth, and perforate all the lines with a needle close and even. Then take finely powdered charcoal three parts, resin one part in fine powder; mix and tie it in a piece of porous muslin, so as to form a dusting bag.

Lay the perforated drawing upon your material, and fasten firmly at each corner by driving pins through it into the board or table you are using. Rub



THE HORN CORNUCOPIA.

the dusting bag over the perforations, which will permit the dust to fall through the holes, and thus outline the pattern.

After carefully removing the paper drawing, lay blotting paper over the dust pattern and go over it with a warm flat-iron. The heat will melt the resin and fix the pattern. If the cloth to be embroidered is black, use finely pulverized chalk in place of the charcoal.

Silver Paper Shaving Case.—A simple and pretty case may be made of the silver paper canvas. Cut two pieces, each eight inches long and five and one-half inches wide. Upon one piece embroider with single zephyr or filling silk, any simple pattern. The lightest shade of blue, pink, or a wine scarlet, are colors that look well on the silver paper.

Before lining the two pieces with silk, either round the corners or cut them off, according to the shape you prefer. Now finish the embroidered piece by sewing around the edge a quilling of satin ribbon, and supplying each corner with a tiny bow.

Get several sheets in different colors of tissue paper, fold and cut a trifle smaller than your pieces of silver paper; have the edges of the tissue paper pinked or notched, and place it between the pieces of silver canvas, when a few stitches will fasten the whole together at the top, to which attach a ribbon for hanging against the wall. If it is desired to put an elaborate pattern on this case, the common perforated cardboard would best suit such a purpose.

Grape Leaf Shaving Case.—For a pattern take a grape leaf. Lay it upon some cardboard and draw its outlines with a pencil. Cut two leaves, also tissue paper, the same shape. For one case it will take about six sheets of tissue paper—red, white, green, yellow, brown and blue. Fold them four or eight times, according to size.

Cover your cardboard with green silk and overcast the edge or bind with ribbon. Imitate the veins of the leaf with long stitches of green sewing silk. The tissue paper grape leaves (upon which the razor is to be wiped) are inserted between the covers, and there must be a loop of ribbon at the stem end by which to hang it up.

To Copy Butterfly Wings.—Take pure collodion and brush it upon good stout paper; then with a pair of forceps take the wings of the butterflies and brush them over also with collodion; now place the wings in their natural position upon the paper. Both operations should be done quickly, as the collodion rapidly dries.

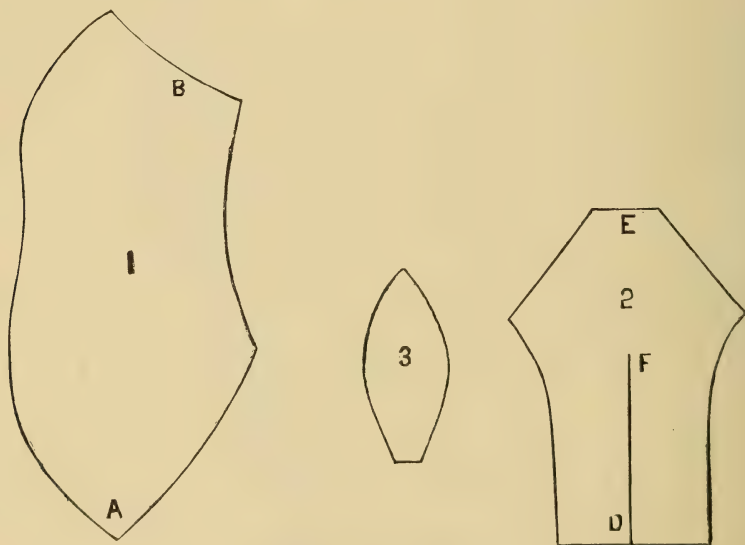
By the agency of collodion the wings adhere to the paper, but when it is dry and the wings are removed by forceps from it, the color scales of the butterflies' wings adhere to the paper. The body of the insect can then be drawn in crayon or pencil. Its natural resemblance can thus be preserved for any time.

To Make Feather Flowers.—A lady writer says she never uses paints or dyes, except to represent green leaves, and has made handsome wreaths and bouquets without a single feather except the natural colors. For white, use goose feathers; for yellow, the feathers from the breast of the meadow lark;

for scarlet, peel off the red from the blackbird's or bobolink's wing and press it out flat until it dries, and you will have a fine double flower, which only needs a wire stem. Prairie chicken and Guinea fowl feathers make nice mottled flowers. Pea-fowl feathers answer nicely for green, and some of the feathers on its body make beautiful velvety flowers.

Use two sizes of the wire—the coarser for stems and the finer to wind the stem of each petal of such flowers as roses before they are formed into flowers. Get the natural flowers you wish to imitate and pick them to pieces for patterns. Wind the stems with green tissue paper and form into wreaths or bouquets.

To Make a Cloth Rabbit.—The material required for a cloth rabbit is a quarter of a yard of white or gray Canton flannel, with very long nap; a tin box the size of a small pill box—box must have a tight fitting cover; cotton for stuffing; two small white beads with red eyes, if you make a white rabbit; a gray one requires black beads; for a white rabbit a small quantity of pink



PATTERNS FOR CLOTH RABBIT.

cambric to line the ears; for a gray one, line ears with the same, being careful to leave the fuzzy or wrong side out.

Cut of the Canton flannel two pieces the shape of fig. 1, six and a half inches long and three and a half inches wide at the widest place, allowing a little for seams. Now place the two pieces together evenly and seam on the machine to A in the back and B in the front. Cut one piece like fig. 2, four and three-fourth inches long and three and a half wide at widest place, cutting a slit in it up to F. Now join fig. 2 to fig. 1, by placing the part marked D exactly at B:

the narrow end, or E, will then come at A. Use a long, slim lead pencil to push in the cotton, as the rabbit must be stuffed very full.

Begin stuffing after you have seamed the rabbit form up, excepting the slit from D to F. After you have the stuffing half done, push in the tin box, in which you have previously placed three or four small buttons. Stuff just as full as the form will hold, and then close up the slit by turning in the edges and whipping neatly on the right side.

Cut four pieces like fig. 3, two of pink cambric and two of the white Canton flannel, if you are making a white rabbit. Paste the pink cambric lining for the ear forms on the right side; use mucilage or a small quantity of starch.

When dry, place the bottom part of the ear at the proper point on each side of the head. The ears are folded together at the narrow point, and are sewed so as to incline back a very little; sew on glass beads for eyes. Take a long stitch back and forth three or four times with pink split zephyr to represent nose and mouth. At A sew a twisted tuft of cotton for the tail. The rabbit is now complete.

Crystallizing Grasses.—Almost any kind of grass looks well when crystallized, but the long feathery grasses give the most satisfaction, as they are ornamental when only partially covered with the alum, while the others should be covered completely. When you have gathered all you wish and dried them thoroughly, you can either crystallize them before forming them into a bouquet or make the bouquet first and crystallize it afterward.

Pulverize a pound of the best alum, and dissolve it over a slow fire in a quart of pure soft water. Do not let it boil, and be very careful to keep everything out of the solution that can possibly stain it, for the beauty of the grasses depends on the pure whiteness of the crystals. A new earthen bowl is the best dish for the purpose. When the alum is all dissolved, let the solution cool down to a little more than blood heat; meanwhile arrange your grasses in a bowl and pour the solution over them, cover up, and set away for a few hours. Then take them out carefully, dry them in the sun four or five hours, and put them in the vase prepared for them. Do not move them for several days. After a little practice the work can be done to perfection. The time for the grasses to remain in and the warmth of the solution are the most important; if they stay in too long the coating will become heavy.

The grasses should be removed when sufficient alum is deposited upon them. Small crystals look the best, and in order to keep them so, the grass should be often moved and turned about. The crystals may be made of different colors by using for blue a small piece of indigo; for red use carmine, or vermilion.

Crystallized grasses, when mixed with everlasting flowers, make beautiful winter bouquets. Snowdrops, or wax berries, the seed vessels of wild roses, and asparagus branches covered with their scarlet fruitage may be used with fine effect. Many bright colored berries may be gathered from the swamps and

marshy places to contrast brilliantly with the metallic snowy luster of the alum crystals. Of these, none are more showy than clusters of bitter-sweet.

To Color or Stain Dried Grass.—There are few prettier ornaments, and none more economical and lasting, than bouquets of dried grasses, mingled with unchangeable flowers. They have but one fault, and that is the want of other colors besides yellow and drab or brown. To vary their shade, artificially, these flowers are sometimes dyed green. This, however, is in bad taste, and unnatural. The best effect is produced by blending rose and red tints together with a very little pale blue, with the grasses and flowers as they dry naturally.

The best means of dyeing dried leaves, flowers and grasses, is simply to dip them into the spirituous liquid solution of the various compounds of aniline. Some of these have a beautiful rose shade ; others, red, blue, orange and purple. The depth of color can be regulated by diluting, if necessary, the original dyes with methyl or alcohol down to the shade desired.

When taken out of the dye they should be exposed to the air to dry off the spirit. They then require arranging, or setting into form, as, when wet, the petals and fine filaments have a tendency to cling together, which should not be. The druggists supply the simple dyes of aniline of various colors at a small cost.

Seed Ornaments.—Very pretty rustic ornaments may be made of the seeds of the farm and garden. The white seed of the pumpkin, golden kernels of corn, different pits of melons, apple seeds, peach pits, white, red, and spotted beans, wheat and oats, buckwheat and broom corn, may be so curiously and ingeniously blended as to make leaves and flowers, scallops and points, and when varnished have a rich appearance.

Nuts and pebbles may be used also. There are some very handsome frames covered with pebbles from the brooks, and the seeds of flowers ; and exquisite bouquets may be formed of the same materials.

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